TRANSACTIONS

ROYAL ACADEMY OF MEDICINE IN IRELAND.

TRANSACTIONS

Royal Academy of Medicine

IN IRELAND.

VOL. XVIII.

EDITED BY

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LONDON : BAILLIÈRE, TINDALL, & COX.
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1900.

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   † MACAN, ARTHUR V., M.B., M.A.O., F.R.C.P., Professor of Midwifery T.C.D., 53 Merrion-square, Dublin.

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1889 M'BRIDE, CHARLES, M.D., F.R.S. Edin., Parochial Medical Officer, Wigtown, Scotland.

1887 M'CAUSLAND, RICHARD BOLTON, F.R.C.S., Surgeon Steevens' Hospital, 79 Merrion-square, Dublin. [1]

1887 M'CUTCHEON, A. K. F., L.R.C.P., L.R.C.S., Physician Drumcondra Hospital, 3 Rutland-square, Dublin.

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1887 MACNAMARA, P. J., M.D., F.R.C.S., Sarsfield's House, Kilmallock, Co. Limerick.

1887 McWEENEY, E. J., M.D., M.Ch., Pathologist Mater Misericordiæ Hospital, 84 St. Stephen's-green, Dublin. [3]

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1883 MARQUES, L. PEREIRA, M.R.C.P., L.R.C.S., late Medical Officer Victoria Gaol Hospital, Macao, China.

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1896 MARTLEY, FRANCIS C., M.A., M.D., Camb., M.R.C.S. Eng. & L.R.C.P. Lon., late House Physician St. Mary's Hospital, 32 Upper Merrion-street, Dublin.

1897 MAUNSELL, R. CHARLES B., M.B., B.Ch., B.A.O., Dub., F.R.C.S.I., Surgeon to Mercer's Hospital, 32 Lower Baggot-street. [1]

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1894 MOORE, HENRY, L.R.C.P. & S., Surgeon Mercer's Hospital, late House Surgeon City of Dublin Hospital, late Medical Officer, Basuto Land, S. Africa, 40 Lower Baggot-street.

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1883 MURPHY, JOHN, F.R.C.P, L.R.C.S., Physician Mater Misericordiæ Hospital, 13 Merrion-square, Dublin.

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1886 MYLES, T., F.R.C.S., Surgeon Richmond Hospital, 33 Merrion-square, Dublin. [1]

1883 NEWELL, F. T. PORTER, M.D. Univ. Dub., F.R.C.S., Medical Officer No. 2 Dispensary, South Dublin Union, 18 Lower Baggot-street.

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1889 NOLAN, MICHAEL JAMES, L.R.C.P., L.R.C.S., Resident Medical Superintendent Down District Lunatic Asylum, Downpatrick.

1885 NORMAN, CONOLLY, F.R.C.P., Medical Superintendent Richmond District Lunatic Asylum, Dublin. [1]

1886 NORTON, JOHN J., L.R.C.P., Alrewes, Burton-on-Trent.

1899 O'BRIEN, CHRISTOPHER M., M.B., L.R.C.P.& S., 57 Amiens-street.

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1883 O'KEEFE, PATRICK, M.D., Resident Medical Officer Mountjoy Convict Prison, Dublin.

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1893 PARSONS, ALFRED ROBERT, M.D., Univ. Dublin, F.R.C.P., Physician City of Dublin Hospital, 27 Lower Fitzwilliam-street, Dublin. [1]

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1889 PATTESON, ROBERT GLASGOW, M.B., F.R.C.S., Surgeon Meath Hospital, 20 Lower Baggot-street. [*Deceased.*]

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1887 PEARSON, CHARLES YELVERTON, M.D., F.R.C.S. Eng., Professor of Materia Medica Queen's College, 1 Sydney-place, Cork.

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1895 PRICE, ARTHUR GEORGE, M.B., B.Ch., Univ. Dublin, Greystones.

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1891 ROCHE, ANTHONY, M.R.C.P., L.R.C.S., Professor of Medical Jurisprudence and Public Health Catholic University Medical School, 91 St. Stephen's-green.

1892 RUTHERFORD, WILLIAM, M.D., F.R.C.P.Ed., Visiting Physician District Asylum, Ballinasloe.

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† SCOTT, JOHN ALFRED, M.D., F.R.C.S., Professor of Physiology Royal College of Surgeons, 36 Lower Baggot-street, Dublin.

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1894 STEVENS, THOMAS G., L.R.C.P. & S., Assistant-Master Coombe Hospital, 23 Upper Fitzwilliam-street, Dublin.

† STOKER, SIR THORNLEY, M.D., late President R.C.S., Surgeon Richmond Hospital, Surgeon Swift's Hospital for Lunatics, 8 Ely-place, Dublin.

† STOKES, SIR WILLIAM, F.R.C.S., Surgeon to the Queen in Ireland, Surgeon Meath Hospital, Professor of Surgery Royal College of Surgeons, 5 Merrion-square, North, Dublin. [*Deceased*].

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1893 SYMINGTON, JOHNSON, M.D. Edin., Professor of Anatomy Queen's Coll. Belfast.

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1893 TWEEDY, ERNEST HASTINGS, L.R.C.P., L.R.C.S., late Assistant Master Rotunda Hospital, 71 Lower Baggot-street, Dublin.

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† WHEELER, WILLIAM IRELAND, M.D., F.R.C.S., Surgeon City of Dublin Hospital, 32 Merrion-square, North, Dublin. [*Deceased.*]

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1898 WINTER, W. A., M.D., B.Ch. Dub., 2 Upper Leeson-street.

1892 WILKINSON, JOHN W., L.R.C.S. & P., late Assistant Surgeon Richmond Hospital, 5 Usher's-island, Dublin.

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1893 WOODS, ROBERT H., M.B. Univ. Dub., F.R.C.S., Throat Surgeon Richmond Hospital, 39 Merrion-square, Dublin.

1894 WYNNE, ALBERT E., L.R.C.P. & S. Edin., late House Surgeon Mercer's Hospital, 187 Great Brunswick-street, Dublin.

1884 YOURELL, M. J., M.R.C.P., 26 Merrion-square, N., Dublin.

MEMBERS.

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1897 BOYD, ALFRED E., M.B., 53 Harcourt-street, Dublin.

1897 BURNES, RUDOLPH A. C., M.B., B.Ch., Dub., 1 St. John's-terrace, N. C. Road.

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1887 COPE, GEO. PATRICK, L.R.C.P., L.R.C.S., late Assistant Resident Medical Superintendent Richmond District Lunatic Asylum, Medical Officer No. 3 Dispensary District, South Dublin Union, 43 Harrington-street.

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1891 ELLIOTT, W. S., M.B., B.Ch., Medical Officer of Constabulary, Malahide, Co. Dublin.

1894 EUSTACE, H. M., M.D., B.Ch. Univ. Dublin, Asst. Physician Highfield Private Lunatic Asylum, Hampstead, Glasnevin.

1897 FLEURY, ELEONORE LILIAN, M.D., R.U.I., Richmond District Asylum, Dublin.

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1883 M'DERMOTT, P. A., F.R.C.S., Mount Clarence, Kingstown.

1892 M'GRATH, JAMES JOSEPH, L.R.C.S., L.A.H., 29 Westland-row.

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1898 REDINGTON, JOHN, L.R.C.P. & S., Richmond Asylum.

1885 RIDLEY, GEORGE P., L.R.C.S., L.R.C.P., Surgeon King's County Infirmary, Tullamore, King's County.

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1887 WYNNE, GEO. NESBITT, M.D., M.Ch., 31 Harcourt-street, Dublin.

STUDENT ASSOCIATES.

BOYCE, C. R., 2 Shanganagh-road, Drumcondra.

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DAVIDSON, MISS, Drumcondra Hospital.

ELLENBOGEN, A., 34 Longwood-avenue, South Circular-road.

GIBSON, B. D., Cappagh House, Merrion.

MASSY, EVERNIA, Medical School, Cecilia-street.

RULES.

1. The name shall be, "ROYAL ACADEMY OF MEDICINE IN IRELAND." (1887.)

Constitution.

2. The Academy shall consist of Fellows, Honorary Fellows, Members, and Student Associates.

Management.

3. The affairs shall be managed by a Council, consisting of the President, Ex-Presidents (1893), the six Presidents of Sections, the General Secretary and Treasurer, the Secretary for Foreign Correspondence, six Secretaries of Sections, and eight Councillors, being two representatives from the Medical, Surgical, Obstetrical, and Pathological Sectional Councils respectively.

Meetings.

4. The Meetings shall be General and Ordinary.

Publication of "Transactions."

5. The "Transactions" shall be published by the Council, subject to the provisions hereinafter contained.

Original Fellows and Members.

6. All the Members of the present Societies (Medical, Surgical, Obstetrical, and Pathological) shall be Original Fellows or Members, without entrance fee, on payment of the annual subscription on or before 31st December, 1882.[a]

Fellows.

7. Fellows of the Royal College of Physicians of Ireland, and of the Royal College of Surgeons in Ireland, shall be admitted, without ballot, on payment of the entrance fee and the subscription for the current year. All others, being Registered Medical Practitioners not directly or indirectly engaged in the sale of drugs, shall be proposed by two Fellows, and elected by ballot by the Council.

8. Candidates shall be proposed at one Meeting of the Council, and balloted for at the next—one black bean in four to reject.

8A. That all Rules referring to the admission of Fellows, Members, and Student Associates shall be interpreted as referring to Ladies as well as Gentlemen.

Privileges of Fellows.

9. Fellows only shall be eligible for office in the Academy. They shall have the privilege of attending all Meetings of the Academy, of making Communications, and of voting and speaking at such meetings. They shall also receive a copy of the "Transactions."

[a] Those who have paid a Life Subscription to any of the above Societies will be admitted to the privilege of Fellows on payment of Member's subscription.

10. These privileges shall not be exercised by any Fellow in arrear with his subscription.

Honorary Fellows.

11. Honorary Fellows, limited in number to 25, may be nominated by the Council, and elected, on motion at a General Meeting of the Academy by a majority of at least two-thirds of those present and voting.

Members.

12. Any Registered Medical Practitioner may be elected as a Member, the election to be conducted in the same manner as that of Fellows.

Privileges of Members.

13. Members shall have the privilege of attending the Ordinary Meetings of the Academy, of making Communications, and of taking part in debate. They can purchase the " Transactions " at cost price.

Student Associates.

14. Registered Medical Students may be elected Student Associates for the period of one year. The Subscription must be paid before election, and the Council may elect without notice of motion.

15. Student Associates shall have the privilege of attending the Ordinary Meetings of the Academy.

Annual Subscription.

16. Fellows shall pay £2 2s., and Members £1 1s. Student Associates shall pay 5s. The Subscription shall become due on the 1st of October in each year, and if the Subscription be not paid on or before the first Meeting in February, the defaulter shall cease to belong to the Academy, unless the delay shall be accounted for to the satisfaction of the Council. No Fellow shall vote at the Annual General Meeting who has not paid his subscription for the year. Medical Officers of the Army and Navy, and Registered Medical Practitioners not residing within 15 miles of Dublin, are eligible as Fellows of the Academy on payment of the entrance fee, and an annual Subscription of £1 1s.

Entrance Fee.

17. After admission of Original Fellows, all Fellows shall pay an entrance ee of £1 1s.

Council.

18. The Council shall meet on the first Wednesday in the month throughout the Session, or oftener should they see occasion—five to form a quorum.

19. Notice of all Extraordinary Meetings shall be transmitted by the Secretary to every Member of the Council. The President or any five Members of Council may call an Extraordinary Meeting of the Council. The Council shall determine questions by vote, or by division if so demanded, the President having a casting vote only. Any regulation of the Council shall have the force of a law, until submitted to the next General Meeting. The Council shall have the power of filling up any vacancies which may occur in the list of Officers of the Academy, except that of President, before the Annual General Meeting. If a vacancy in the office of President should occur, the General Council shall summon a Special General Meeting of the Academy to fill such vacancy. (1888.)

Sectional Councils.

20. There shall be six Sectional Councils elected by the Annual General Meeting in October, termed respectively—the Medical, the Surgical, the Obstetrical, and the Pathological, the State Medicine, and the Anatomical and Physiological Councils.

21. No Fellow shall be eligible as a candidate for election on more than two Sectional Councils, but no Fellow shall be eligible as a candidate for election on both the Medical and Surgical Sectional Councils. (1888.)

22. Each Sectional Council shall consist of the President of the Section and ten Members, one of whom shall act as Secretary to the Section ; except the State Medicine and Anatomical and Physiological Councils, which shall each consist of a President and six Members. (1888).

Meetings of Sectional Councils.

23. Each Sectional Council shall meet on a fixed day at least one week before the Ordinary Meeting of their Section, three to form a quorum.

Powers.

24. Each Sectional Council shall have the power of making any such arrangements as it thinks necessary to carry on the work of the Ordinary Meetings which are under its charge, provided that such arrangements do not interfere with the general laws of the Academy ; and any Rules laid down by such Council shall have the force of laws at the Ordinary Meetings under its charge, until submitted to the General Council.

25. Each Sectional Council shall have the power of filling up any vacancies that may occur among its Members until the Annual General Meeting.

Committee of Reference.

26. The Council shall appoint a Committee of Reference, to report upon morbid growths and other specimens exhibited before the Academy ; of this Committee the Exhibitor shall, for the occasion, be a Member.

Officers.

27. A President, to be elected by the Annual General Meeting in October, and to hold office for three years.

28. The Presidents of the Colleges of Physicians and Surgeons for the time being shall be the Presidents of the Medical and Surgical Sections. The Presidents of the other Sections shall be elected by the Fellows at the Annual General Meeting, and shall hold office for two years. (1888.)

29. One General Secretary and Treasurer to be elected at the Annual General Meeting.

30. It is expedient that a fixed salary (of one hundred guineas) shall be paid yearly to the General Secretary in consideration of the fact that the editing of the " Transactions" is part of his duties.

31. One Honorary Secretary for Foreign Correspondence to be elected at the Annual General Meeting. (1888.)

32. The Councillors for each Section to be elected at the Annual General Meeting. Each Sectional Council shall elect two Members to act on the

General Council, except in the case of the Sections of State Medicine and Anatomy and Physiology. (1888.)

33. Two Members in each Sectional Council shall retire annually, and be ineligible for re-election for one year, except in the Council of the Section of Anatomy and Physiology, in which only one shall retire (Oct., 1896).

34. Six Secretaries, one for each Section, to be appointed by the Sectional Councils.

35. At all elections after the year 1882, any Fellow desirous of nominating a candidate for election shall, at least one fortnight before the Annual General Meeting, forward an application to the General Secretary to enter the name of such Fellow on the list of candidates for office, provided that the Fellow so nominated shall have consented to act. (1891.)

36. That all elections shall be by ballot, but Fellows residing more than 15 miles from Dublin, and those incapacitated from attending by illness (to be certified), may record their votes by ballot papers, sent to the presiding officer in sealed envelopes provided for that purpose (Oct., 1896).

37. That in all elections to the Sectional Councils there shall be affixed to the name of each candidate the number of meetings of that particular Section for the Council for which he is now a candidate that he has attended. (1898).

Duties of Officers.

38. *The President* shall preside at the Annual and Special General Meetings and at General Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

39. *The Presidents of Sections* shall preside at the Ordinary Meetings of the Academy, and shall also preside at the Sectional Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888).

40. *The General Secretary* shall attend all General Meetings of the Academy and General Council. He shall take minutes of such meetings, to be read at the following meeting.

41. He shall receive and have charge of all papers intended for publication in the "Transactions" of the Academy, after they have been handed over to him by the Secretaries of the several Sections.

42. He shall, on receiving notice from the Secretary of a Section, send out to all the Members notices of the title or titles of the paper or papers for the next Ordinary Meeting, with the name or names of the authors, and, so far as possible, of the subjects for Exhibition, with the names of the Exhibitors.

43. He shall arrange for the Exhibition of specimens and the reading of papers, which are forwarded to the Academy by those who are absent, or are not members.

44. The General Secretary and Treasurer shall receive all moneys, and lodge the same in bank to the account of the Academy, and all cheques shall be signed by the Treasurer and one other Councillor.

45. The Accounts shall be audited by two Fellows, not Members of Council, to be appointed by the President at some meeting previous to the Annual Meeting.

Duties of Secretaries of Sections.

46. To attend the Meetings of the Council of the Section and the Ordinary Meetings of the Academy, under the management of said Council, and to take minutes at such meetings, to be read at the next following meeting of that Section.

47. To keep such papers as the Sectional Councils recommend for publication, for the purpose of handing them over to the General Secretary.

48. To inform the Secretary of the Committee of Reference of any specimens referred to that Committee, and to transfer the specimens to that Secretary.

49. To give notice to the General Secretary, one week previously to the meeting, of the titles of papers for the evening, the names of the authors, and, so far as possible, the objects for Exhibition, with the names of Exhibitors, so that the General Secretary may inform the Members.

Meetings.

50. The Annual General Meeting to take place on the last Friday in October, for the election of Officers and Members of Council, and for the general business of the Academy.

51. Due notice of the meeting shall be given by the Secretary to all Members at least three weeks previously. (1891.)

52. No motion involving a change of these Rules shall be brought before this meeting except one week's notice thereof shall have been given by the Secretary to each Member.

53. The President may—and shall forthwith, on receiving a requisition signed by seven Fellows, at any time—on giving one week's notice, summon a Special General Meeting, for the consideration of particular business, the nature of which must be specified in the letter of summons convening the meeting, and at such meeting no other business can be transacted. In the event of the President being unable, from any cause, or declining, to summon a Special General Meeting of the Academy, it shall be in the power of the General Council to summon such meeting. (1888.)

Ordinary Meetings.

54. The communications to be submitted to the Ordinary Meetings shall be grouped under the following heads :—Medicine, Surgery, Pathology, Obstetrics, State Medicine, and Anatomy and Physiology ; and the conduct of such meetings shall be in the hands of the several Sectional Councils, each Sectional Council to have the management of the Ordinary Meeting in rotation, as arranged by the General Council. (1888.)

55. The Ordinary Meetings shall be held on every Friday evening, from the first Friday in November until the last Friday in May, inclusive, at eight o'clock, except during the Christmas and Easter recesses.

56. All Fellows, Members, and Student Associates attending the meetings, shall write their names in the attendance book.

57. Any Fellow or Member may introduce two Visitors by cards obtained from the Sectional Secretaries.

58. Officers of the Army or Navy Medical Departments shall, on presenting their cards, be admitted to the Ordinary Meetings of the Academy.

59. No communication shall exceed twenty minutes in its delivery, nor any speech thereon ten minutes, except by permission of the Chairman. No one shall speak twice upon the same communication, except the author, who has the right of reply.

60. A paper by any other than a Fellow or Member of the Academy shall not be read before the Academy unless the author of such a communication shall have obtained permission to do so from the Council of the Section before which the communication is proposed to be read. (1892.)

Ordinary Meetings.—Order of Business.

61. (1.) Chair to be taken at 8 30 p.m.

(2.) Chairman to read list of specimens, &c., exhibited by card, together with the names of the Exhibitors.

(3.) No Pathological Specimen shall be exhibited at any Section other than the Pathological and Obstetrical, except by card. This Exhibition shall not exclude any subsequent communication regarding it at the Pathological Section.

(4.) There shall be no Exhibition of Specimens by card in the Obstetrical or Pathological Sections.

(5.) Any member shall have liberty to exhibit any recent specimen at any of the meetings of the Obstetrical Section, provided it illustrates any question in gynæcology.

(6.) At the meetings of the Obstetrical Section recent specimens may be exhibited, and the President shall invite discussion thereon, provided that such exhibition of specimens or discussion, if any, thereon, must terminate at 9 o'clock, p.m., but that, if necessary, they may be resumed after the papers for the evening have been read and discussed.

(7.) Chairman to ask if any member has any observations to make or motion to propose relative to any living specimen on the List of Exhibition.

(8.) Chairman to call upon the author of the first paper on the list to read his paper.

(9.) Chairman to call upon members to discuss the paper, or, at his discretion, to take any other paper or papers on the list relating to the subject, and have the discussion subsequently on all such papers collectively.

(10.) When the last paper has been discussed, the Chairman to ask if any member desires to speak upon any of the specimens exhibited by card.

(11.) After the discussion upon any specimen, the Exhibitor has the right of reply.

Regulations regarding the Exhibition of Specimens by Card.

62. (1.) Any member may exhibit by card at any Ordinary Meeting, except at the meeting of the Pathological and Obstetrical Sections. At the meetings of the Pathological all specimens must be presented and described *viva voce*, and debate may be invited hereon.

(2.) Notice shall, if possible, be given to the General Secretary, or the Secretary of the Section, on or before the previous Ordinary Meeting.

(3.) Specimens must be in the room at 7 45 on the night of Exhibition.

(4.) Specimens for Exhibition by card shall be open for inspection at 8 p.m.

(5.) A card, containing all particulars for publication, shall be placed with the Specimen. Cards for this purpose are to be obtained from the Secretary.

(6.) The Exhibitor should be present, and he shall furnish further details if asked for.

(7.) Every Exhibitor shall submit the Specimen or Specimens on view to the Committee of Reference, if the meeting so decide.

Exhibition of Pathological Specimens.

63. No lengthened reference to treatment shall be allowed upon any Specimen, except by the express permission of the Chairman. Whenever it has been agreed that a Specimen exhibited at a Sectional Meeting of the Royal Academy of Medicine in Ireland shall be sent to the Reference Committee to report thereon as to its nature, the Exhibitor is to retain the custody of the specimen until he shall be summoned to a meeting of said Committee to be convened by its Secretary, on an early day, when he will attend and submit it for examination. (1889).

By-laws concerning " Transactions."

64. The " Transactions " shall consist of such Communications made to the Academy by or through Fellows or Members as may be deemed by the General Council suitable for publication ; also, of discussions of importance or interest arising out of such Communications.

65. All Communications accepted by the Academy become the property of the Academy, but authors may also print their Communications, subsequent to the reading of the same before the Academy, in any publication in addition to the "Transactions." Papers shall be handed to the Secretary of the Section immediately after they have been read. (1891.)

66. The "Transactions " for the year shall be presented to all Fellows of the Academy who have paid their Annual Subscriptions.

67. The " Transactions " may be purchased by Members at cost price.

68. The Publication Committee of each Section shall meet not later than the Tuesday after each meeting of the Section, for the purpose of abstracting the proceedings—the abstract to be placed in the printer's hands on same evening, and forwarded to the editors of medical journals with the least possible delay. (1888.)

69. Contributors of papers may send their papers to the Academy printer early enough to allow of their being put in type before the meeting, provided the author be responsible for the cost of same should the General Council deem the communication not suitable for publication in the " Transactions."

70. That on the evening of the day of meeting of the Sectional Council, when the papers for the next meeting have been decided upon, a circular be sent to each contributor informing him :—

    (1.) That he is expected to be ready or else take his place at the bottom of the list.

    (2.) That he must have an abstract ready with his paper, otherwise he will be noted in the published proceedings in such form as the Publication Committee think fit.

71. The General Council is empowered to defray the expenses in whole or in part of any illustrations which it may consider advantageous to the elucidation of the papers published by the Academy.

72. An abstract (prepared by the author) of each communication made at the Academy, along with a report of the discussions thereon, shall be furnished to the editors of such medical journals as may desire to publish them, and the authors of such communications shall be empowered to publish their papers *in extenso* in any periodical or periodicals they may think fit, such communications also to appear in the "Transactions," provided the Council consider them worthy of insertion.

Expulsion of Fellow or Member.

73. Expulsion of a Fellow or Member can take place only at a General Meeting of the Academy, on the motion of the Council, if two-thirds of the Members present shall vote for the same by ballot. Of such ballot the Council must give at least fourteen days' notice in writing to every Fellow of the Academy.

New Laws.

74. New Laws, or alterations in existing Laws, can be proposed only at the Annual General Meeting. Any Fellow proposing such alteration shall give notice to the General Secretary at least ten days before the General Meeting in October.

REPORT.

THE General Council beg to report that the number of Fellows for the Session 1898-9 was 240; of Members, 32; of Student Associates, 20. The Fellows increased by 5, the Members by 3, and the Student Associates by 3.

The Council regret that the Balance Sheet shows for the first time a deficit in the shape of an overdraft at the Bank. This is due to the large expenditure on microscopes, which was sanctioned at the last Annual General Meeting, and which the Council considered should be met out of income and not out of capital. The Council expect that receipts for the coming Session will be sufficient to defray the current expenses, and also to pay off the debt to the Bank.

The question of publishing an official account of the Proceedings of the Academy in the *Dublin Journal of Medical Science* was considered by the Council, and after much discussion it was decided that, owing to the existing arrangements with the publishers no satisfactory alteration could be effected.

On the suggestion of the State Medicine Section the Council summoned a Special General Meeting of the Academy on March 9th, to determine what steps, if any, the Academy should take in the movement against Tuberculosis.

At the Meeting the following Resolutions were carried :—

(1.) " That in view of the importance of the subject of Tuberculosis this General Meeting of

the Royal Academy of Medicine in Ireland take steps to organise a combined Meeting of the various Bodies interested in Public Health, for the purpose of getting up a scheme for the better prevention of this disease."

(2.) "That the following be invited to take part in the combined Meeting:—The University of Dublin, the Royal University, the Royal Colleges of Physicians and Surgeons, the Public Health Committee of the Corporation, the Urban Sanitary Authorities of the Dublin Metropolitan District, the Dublin University Biological Association, and such other Bodies as the Committee shall suggest."

(3.) "That the following Committee be appointed to arrange for the Meeting:—The President and Secretary of the Academy, the Presidents of the Medical, Surgical, and State Medicine Sections along with the Council of the latter Section, and Drs. McWeeney, O'Carroll, and Denham."

Several meetings of the Combined Committee were held in the Royal College of Physicians, at the last of which his Excellency the Lord Lieutenant took the chair, and a Branch of the National Society for the Prevention of Tuberculosis was formed in Dublin.

The Council record with deep regret the deaths of the following respected Fellows of the Academy—Dr. M. A. Boyd, John Eustace, Wm. Frazer, and W. Hamilton.

General Treasurer's Report for the Session 1898-99.

RECEIPTS.

	£	s.	d.
To Balance in Bank	21	7	10
,, Subscriptions	492	4	0
,, Dividends on £596 2s. 4d., at 2¾ per cent.	15	17	0
,, ,, £155 1s. 10d., at 2½ per cent.	3	17	8
,, Fannin & Co., Ltd., part Cost of Illustrations—Vol. XVI.	4	1	6
,, Overdraft on Bank	33	1	1
Total	**£570**	**9**	**1**

EXPENDITURE.

	£	s.	d.
By General Secretary	105	0	0
,, Printing, Stationery, and Postage	87	10	7
,, Transactions, Vol. XV., and Illustrations	172	11	10
,, Royal College of Surgeons	15	15	0
,, Royal College of Physicians	15	15	0
,, Reporters	29	8	0
,, Servants	20	10	0
,, Groceries and Milk	19	0	4
,, Sundries	2	2	6
,, Lantern	1	2	4
,, Microscopes	100	17	2
,, Cheque Book	0	8	4
,, Interest on Account	0	8	0
Total	**£570**	**9**	**1**

We have examined the Accounts and Vouchers, and certify the same to be correct.

Oct. 4th, 1899.

{F. T. PORTER NEWELL, F.R.C.S.
{HENRY MOORE, F.R.C.S.

The Capital is invested in the names of Sir George Duffey, Sir William Thomson, and Dr. Walter G. Smith.

*Volume XVII. of the " Transactions " has been forwarded
to the following :—*

IRELAND : —

Dublin Medical Journal	-	-	-	Dublin.
Medical Press -	-	-	-	Do.
National Library	-	-	-	Do.
Royal College of Physicians	-	-	-	Do.
Royal College of Surgeons	-	-	-	Do.
Royal Irish Academy -	-	-	-	Do.
Royal Dublin Society -	-	-	-	Do.
Royal University	-	-	-	Do.
Trinity College	-	-	-	Do.
Queen's College	-	-	-	Belfast.
Do.	-	-	-	Cork.
Do.	-	-	-	Galway

ENGLAND :—

Birmingham Medical Review	-	-	-	Birmingham.
Medical Institute	-	-	-	Do.
Bristol Medico-Chirurgical Journal	-	-	Bristol.
Medico-Chirurgical Society	-	-	-	Do.
Medical Annual	-	-	-	Do.
University	-	-	-	Durham.
Provincial Medical Journal	-	-	Leicester.
Liverpool Medico-Chirurgical Journal -	-	Liverpool.
Annals of Surgery	-	-	-	London.
Asclepiad	-	-	-	Do.
British Dental Association	-	-	-	Do.
British Medical Journal	-	-	-	Do.
Clinical Society	-	-	-	Do.
Harveian Society	-	-	-	Do.
Hospital Gazette	-	-	-	Do.
King's College -	-	-	-	Do.
Lancet -	-	-	-	Do.
Library, British Medical Journal, 429 Strand -	Do.
Medical Brief -	-	-	-	Do.
Medical Magazine	-	-	-	Do.
Medical Review (Med. & Surg. Review of Reviews)	Do.
Medical Times -	-	-	-	Do.
Pathological Society	-	-	-	Do.
Pharmaceutical Journal	-	-	-	Do.
Practitioner	-	-	-	Do.
Public Health, 19 Bloomfield Road, Maida Vale	Do.
Royal College of Physicians	-	-	Do.
Royal College of Surgeons	-	-	Do.
Royal Medical and Chirurgical Society	-	Do.
Sanitary Record	-	-	-	Do.
Society of Apothecaries	-	-	-	Do.
University	-	-	-	Do.
University College	-	-	-	Do.

ENGLAND—*con.*—

Owens College	- - - - -	Manchester.
Victoria University	- - - -	Do.
Quarterly Medical Journal, Dr. Coching, 277		
Glossop Road	- - - -	Sheffield.
Sheffield Medical Journal, 17 Eyre Street	-	Do.

SCOTLAND :—

Marischal College	- - - -	Aberdeen.
University	- - - - -	Do.
University College	- - - -	Dundee.
Edinburgh Medical Journal	- - -	Edinburgh.
Royal College of Physicians	- - -	Do.
Royal College of Surgeons	- - -	Do.
Scottish Medical and Surgical Journal	- -	Do.
University	- - - - -	Do.
Faculty of Physicians and Surgeons	- -	Glasgow.
Glasgow Medical Journal	- - -	Do.
University	- - - - -	Do.
Do.	- - - - -	St. Andrews.

EUROPE :—

University College	- - - -	Amsterdam.
Archiv für Klinische Chirurgie	- -	Berlin.
Centralblatt für die medicinischen Wissenschaften	Do.
University College	- - - -	Do.
Zeitschrift für Chirurgie	- - -	Do.
University College	- - - -	Bologna.
Archives Cliniques de Bourdeaux, 46 Cours du		
Jardin-public	- - - -	Bordeaux
Société Anat. & Physiol.	- - -	Do.
Académie Royale de Médecine de Belgique	-	Brussels.
Société Belge de Chirurgie	- - -	Do.
Université Libre	- - - -	Do.
University College	- - - -	Christiania.
Académie de Médecine	- - -	Copenhagen.
Society of Medicine, care of Dr. J. V. Wichman	Do.
La Grèce Medicale, Syra	- - -	Greece.
University College	- - - -	Madrid.
Archivio di Ortopedia (Dr. Pietro Panzeri,		
Instituto dei Rachitici)	- - -	Milan.
Archivio d'Ortopedia, via S. Calimbro 31	-	Do.
Académie de Médecine	- - -	Paris.
Archives de Chirurgie, 108 Boulevard St. Germain,	Do.
Archives Orientales	- - - -	Do.
Archiv. Provinciales de Médecine	- -	Do.
Journal de Médecine et de Chirurgie (M. Lucas,		
Championière)	- - - -	Do.
Journal de la Santé	- - - -	Do.
Revue de la Tuberculose	- - -	Do.
Revue de Chirurgie	- - - -	Do.
University College	- - - -	Do.

EUROPE—*con.*—

University College	St. Petersburg
Do.	Stockholm.
Medical Society, Royal University	Upsala.
University College	Vienna.
Naturforschende Gesellschaft, Dr. Rudolf Martin, Seefeldstrasse 119	Zurich.

AMERICA :—

Brooklyn Medical Journal	Brooklyn.
Journal, American Medical Association	Chicago.
Medico-Chirurgical Journal	Do.
Academy of Medicine, 17 West 43rd Street	New York.
Archives of Pediatrics	Do.
New York Medical Journal, 72 Fifth Avenue	Do.
University College	Do.
American Journal of the Medical Sciences	Philadelphia.
Association of American Physicians	Do.
College of Physicians	Do.
University College	Do.
University College	Quebec.
University Lavel	Do.
American Practitioner	Louisville.
University College	Toronto.
University Quarterly	Do.
Annals of Gynæcology and Pediatrics, 871 Beacon Street, Boston, Mass.	United States.
Charlotte Medical Journal, Charlotte, N. C.	Do.
Director-General Billings, Washington	Do.
Dr. Stockwell, Medical Age, Detroit, Michigan	Do.
Journal of Comparative Neurology, Denison University, Granville, Ohio	Do.
Medical Library Association, 19th and Stout Streets, Denver, Colorado	Do.
Medical Brief, St. Louis, Mo.	Do.
Societie d'Higiene	Habana.

AUSTRALIA :—

University College	Adelaide.
Do.	Auckland.
Do.	Melbourne.
Do.	New Zealand.
Medical Society of Victoria, Melbourne (Meyer and Metzler, Great Portland Street, London)	Do.
The Australian Medical Gazette,	Sydney, N.S.W.
University of Sydney, care of Young J. Pentland, 38 West Smithfield, London, E.C.	Do.

ASIA :—

University College	Bombay.
Do.	Calcutta.
Imperial University Library	Tokio, Japan.

TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

SECTION OF MEDICINE.

DISSEMINATED CEREBRO-SPINAL SCLEROSIS.

By JAMES CRAIG, M.D., F.R.C.P.I.;
Physician to the Meath Hospital.

[Read in the Section of Medicine, November 17, 1899]

I HAVE ventured to exhibit this patient to-night, not merely with the object of demonstrating the clinical features of the now well-known classical type of insular sclerosis as first pourtrayed by the masterly pen of Charcot, and of which the present case is an excellent example, but also to afford myself an opportunity of analysing the earlier and later manifestations of the disease in one at least of the various forms which deviate from the classical picture, and which are spoken of as the aberrant types.

My purpose, therefore, is, in the first place, to attempt to show to you, as clearly as an occasion like this will permit, the salient features in connection with the patient before you, and subsequently to refer to two other cases, one of which, in particular, was surrounded with diagnostic difficulties, the relation of which cannot fail to be of interest to the majority of my hearers.

This man whom I exhibit is thirty-four years of age, is unmarried, and comes from the West of Ireland, where his people are engaged in farming. As a youth he had a hard life, being out on the farm in all weathers, and subject to severe bodily fatigue. In his personal history there is no evidence of alcohol, syphilis, injury, or attacks of infectious fevers, save a visitation of measles during his earlier years. He has had no other mental disturbance than what might naturally be expected to arise in the presence of the awful scourge of paternal insanity. To this affection his father succumbed some twenty years ago, and with the exception of the death of a sister from consumption the remainder of his near relatives—viz., mother, two sisters, and a brother—seem to be healthy.

About seven years ago he observed that he was easily tired when walking. Since then there has been a slowly-progressing weakness and stiffness in his lower limbs, with an occasional feeling in them of "pins and needles." Three years ago he was compelled to give up work entirely, got thin, fancied his sight was not as good as heretofore, and required the aid of a stick to support and steady him in his efforts at locomotion. In addition to the difficulty he has experienced in walking he has been troubled with a delay which precedes the immediate act of micturition, and, indeed, on admission to the Meath Hospital, some ten weeks ago, his condition, according to his own belief, was summed up in the following comprehensive sentence—"I can't walk, and my bladder acts slowly."

On proceeding now to examine into the clinical features of this case, his difficulties become at once apparent when he is asked to get up and walk. He rises slowly with the aid of his stick, his left hand being pressed against the seat of his chair, and his head erectly poised. On his feet he is ill at ease and his whole body begins to shake, but still on

closing his eyes and bringing his heels together he is able to maintain his equilibrium. On moving forwards he keeps his legs somewhat apart, lifts the right foot higher than necessary and plants it down rather quickly, with the heel and outer part of the sole first touching the floor. The left is carried forward with a sweeping movement rather than raised, the front of the sole first touches the floor, and as his weight presses on it the body is jerked upwards, owing to the ankle clonus. In fact there is a combination of the spastic and ataxic gaits. When he sits down again we find the knee-jerks are increased, while rectus and ankle clonus can be elicited quite easily. His sensation is perfect, the muscles are not unduly wasted, either as a whole or in a particular group, but their irritability can be elicited by tickling the soles of his feet, and their rigidity may be felt by handling or on making passive movements.

On stimulating the plantar reflex by tickling his sole you will observe, especially in the case of the left foot, that the toes become extended at the metatarso-phalangeal articulation, and this result is particularly apparent in regard to the great toe, which is most influenced by the stimulus. This "toe phenomenon" of Babinski is present when the pyramidal tract is deranged, and is of significance in distinguishing purely hysterical conditions from organic disease, for Babinski found that in health and in functional disturbances the toes are either flexed or remain unmoved when the plantar reflex is stimulated.

We find then, as regards his legs, that they are in a condition akin to what is met with in spastic paraplegia, although here we have a combination of the spastic and ataxic gaits, and the patient when standing is not quite steady. Turning next to inquire into the shaking which took place when the patient stood up, you will observe that when his head is supported, his hands resting on his knees, and his feet resting

on the ground, no evidence of tremor exists; when, however, the support is removed from his head it begins at once to shake; also when he uses his arms they immediately show these coarse and irregular tremors with which the term "intention" has come to be allied. Note particularly the rapid side-to-side movements in his hand when he places his forefinger on the tip of his nose, also the jerky movements which accompany his almost ineffectual efforts to put his feet into his boots.

Next, on asking him to repeat certain phrases, we observe the slowness with which the words are produced, the monotonous character of the voice, and the attempt to slur over the ends of the words, but at the same time this symptom of "syllabic or staccato speech" is not distinctly characteristic in the present case, and is absent in many instances.

Finally, let us inquire into the condition of his eyes, and as I can here only demonstrate the nystagmus and the impaired movements in the balls, I must ask you to accept the following concise but exhaustive statement made by Mr. Swanzy, who kindly examined the case for me:—

"There is defective vision in each eye—L. E., $\frac{6}{3 \cdot 6}$; R. E., $\frac{6}{12}$. The fields of vision are not contracted and I can discover no central scotoma. The optic papillæ do not look quite normal, and have a dirty white complexion. There is slight nystagmus and also defective power of consensual lateral motion and of upward movement of the eyeballs. The size and action of the pupils is normal."

My own observation on the last-named point has been that the pupils are generally slightly dilated.

We have, then, in this case an easily recognised and classical type of insular sclerosis. We have the nystagmus with amblyopia and defective movement of the eyeballs; we have the slow, monotonous though not very distinctive syllabic speech; we have the coarse, rythmical tremors, which immediately appear when the voluntary muscles are

brought into use; and we have the spastic condition of the limbs, with increased reflexes, rigidity, and weakness.

I now pass on from this case to that of a boy, aged fourteen, whom I saw in June, 1898. I found him quite blind, with obvious nystagmus, intention tremors, slow and deliberate speech, rigid, weak, and spastic extremities, with rectus and ankle clonus, and increased knee-jerks. There was an undoubted history of hereditary syphilis, although the boy was remarkably well grown. I received the following account of his condition:—At nine years of age his mother, noticing something peculiar about his sight, brought him to Dr. C. E. Fitzgerald, who found that his left eye was quite blind, but said he thought it was a congenital condition, and that the right eye was normal, and no damage in it was to be anticipated. However, within the next three years, during which time his parents went to live in London, a spastic condition of his legs developed, and at the age of twelve he had tenotomy performed in London, in order to correct the increasing rigidity and tendency to talipes equino-varus. While slowly recovering the limited use of his legs, of which he had been deprived by this operation, it was found that his sight was getting worse. He was subsequently seen by Mr. Nettleship, who said that the case was quite hopeless, owing to atrophy of both optic discs. I saw him about a year afterwards, when his condition was as already stated. I anticipated some possible improvement from the administration of mercury and iodide of potassium, but in the result I was doomed to disappointment, as no improvement has taken place.

The special points to be noted in this case are—the youth of the patient, the specific history, the early and pronounced ocular phenomena, followed by what is of very rare occurrence in insular sclerosis—complete blindness; and, lastly, the surgical attempt to correct spastic contractions of the

feet, due to grave and progressing lesions of the central nervous system.

The next case is one teeming with interest, but the time at my disposal permits me to mention only the more important facts connected with it. To Dr. C. E. Fitzgerald I am indebted for the notes relating to the ocular symptoms, but I cannot now give them in detail.

Seventeen years ago a girl, seventeen years of age, previously very healthy, developed—

In 1882, transient blurring in the RIGHT eye, with defective vision and hazy disc, from which she completely recovered in a month.

In 1884 there occurred left optic neuritis with right hemiparesis, followed by recovery within a few weeks.

In 1885 there was transitory dimness again of the RIGHT eye.

In 1888 there was transient dimness of sight in *both* eyes, but the discs were normal.

In 1889 there was transient blurring of the *left* eye, with vision and discs normal.

In 1890 there was numbness in the RIGHT leg, weakness in both, giddiness, diplopia, blurred vision, defective lateral movement, and for the first time *nystagmus* in the left eye. Delay in micturition with excessive secretion of urine was noted.

In 1891 there was apparently complete recovery from all the symptoms save very slight *nystagmus*. Patient felt quite strong.

In 1896 patient became unsteady in walking and easily fatigued, knee-jerks were increased, but no ankle clonus and no tremors found; diplopia, blurred vision and nystagmus present; psychical manifestations and slight blunting of mental faculties were noted.

In 1898 *intention tremors* first appeared, legs became quite rigid, ankle clonus and toe phenomenon present; loss of muscular sense in both lower and upper extremities; control of bladder weak. Vision—R. E., $\frac{6}{36}$; L. E., $\frac{6}{12}$; hazy discs, *nystagmus*, no syllabic speech.

If a diagnosis of insular sclerosis cannot be arrived at until the classical symptoms have revealed themselves we shall, by reference to these notes, easily appreciate what lengthened opportunities existed to arrive at a wrong conclusion—

1. *Nystagmus* did not manifest itself for 6 years after the initial symptoms.

2. *A spastic condition of the extremities* was 14 years in developing.

3. *Intention tremors* only appeared at the end of 16 years.

4. While *syllabic speech* cannot be said to have occurred at all.

Now, while the case which I exhibit this evening forms an excellent example of the classical type of the disease, this third case presents a splendid picture of the most common type of the so-called aberrant cases, and as this peculiar form of insular sclerosis is met with most commonly in young women, the problem we are asked to solve in dealing with the earlier features of such cases is mainly one of differentiation between hysteria and this serious organic disease of the central nervous system.

If you will kindly bear with me a little longer I shall endeavour to touch briefly on the points which may help us to arrive at a fairly accurate opinion. Dr. Buzzard, in the *British Medical Journal* of 6th May, 1889, has contributed an excellent article to the literature of this particular part of the subject, and his experience I have here to a large extent embodied with my own observations.

In *Insular Sclerosis.*

1. The most frequent mode of onset is a sudden transient paresis, occurring in one limb, and associated often with tingling and numbness, but no anæsthesia.

2. The paresis rapidly disappears, to reappear in the same or other limbs.

3. Transitory attacks of squinting occasionally usher in the disease.

4. Blurring of the sight in one eye, with considerable loss of vision, may be the first symptom. This is also transient, and may manifest itself repeatedly in the same eye, or may appear occasionally in the other, or in both. Pallor of the disc may or may not be observed, and although vision may be defective, the field of vision is rarely contracted, and then not uniformly so.

In *Hysteria.*

1. There is usually *complete* loss of power when a limb is so affected, and generally there is marked anæsthesia accompanying it.

2. The paralysis is not transient, and is generally confined to the limb or limbs in which it first appears.

3. Not met with.

4. There are never any changes observed with the ophthalmoscope, and the field of vision when abnormal is generally found to be greatly contracted, and that in an uniform manner.

It will thus be seen that it is to the oculists we must confidently look for special help in our diagnosis in the earlier stages of these difficult cases. In the later stages it may be useful continue our contrast :—

In *Insular Sclerosis.*

1. Increased knee-jerks are generally found at some period of the disease, although they may be occasionally absent altogether, or may disappear at times, especially when rigidity is extreme.

2. Ankle clonus when it appears is very distinctive.

3. Intention tremors, which are not always present, and may appear late, are of much significance.

4. Delay in the passage of urine is a very important symptom, while in advanced cases frequent micturition and loss of control over the bladder is usual.

5. Contractions of the limbs occur after a lengthened period of rigidity and spasm, with increased knee-jerks and ankle clonus.

In *Hysteria.*

1. There is not loss of the knee-jerks, although they are sometimes increased, and frequently the increase is accompanied by a jerk of the whole body.

2. True ankle clonus is probably never present, although when a limb is raised spasms often occur resembling ankle clonus, but the foot is flexed and no extension is necessary.

3. The clumsy movements are not readily mistaken for intention tremors, which latter are not produced by functional disturbances.

4. Instead of delay there is, as a rule, total inability to pass urine—in other words, complete retention.

5. Contractions occur quite suddenly, and although knee-jerks may be increased, there is never well-marked ankle clonus, and the gait is generally exaggerated.

6. " Toe phenomenon " may be present.	6. " Toe phenomenon " absent.

I fear I have long ago overstepped both my time allowance and your patience, so that I cannot here touch on the supposed infective origin of this disease, neither can I attempt to dwell on the lamentable failure of every form of treatment which has been adopted for its relief.

Sir J. W. Moore said Dr. Craig had laid before them a very classical paper, which, since this disease was so liable to be confounded with another important disease—namely, hysteria—was worthy of the attention of all clinical and practical physicians.

Dr. J. B. Coleman said that the disease was not very uncommon. A case which he had under observation at present did not differ very much from the case exhibited.

Dr. Finny took exception to one of the diagnostic points Dr. Craig had mentioned as distinguishing this disease from hysteria. The statement he referred to was that ankle clonus was not present in hysteria. He had a clear recollection of ankle clonus occurring distinctly in a case of pure hysteria, and ankle clonus, which was once thought of great value as pointing to structural changes in the pyramidal tract and cord, was not now considered so reliable. In many cases of typhoid fever ankle clonus could be found where there was no evidence of hysteria or structural disease of the spinal cord.

Sir George Duffey said he could corroborate what Dr. Finny had said about the presence of ankle clonus in hysteria. He remembered a case in the City of Dublin Hospital which presented peculiar nervous symptoms, and about which there was great doubt as to the diagnosis. She recovered, although ankle clonus was present.

Dr. Knott said that Sharpe's great test was to ask the patient to shake hands. In cases of chorea the patient made a series of jerky movements, whereas in disseminated sclerosis the patient always went in a curved line. He was struck with the extraordinary similarity in the way patients suffering from this disease carried their heads. He noticed that the pupils of the patient

exhibited were a good deal larger than normal. He suggested that the peculiar monotone of the speech could have been better demonstrated by getting the patient to recite prose rather than poetry.

Dr. R. Travers Smith mentioned a case of a girl, aged about twenty-two, who presented the clinical group of symptoms known as spastic paraplegia. The diagnosis between insular sclerosis and primary lateral sclerosis was at first doubtful, but the question was finally settled at the end of a few months by the patient developing an external strabismus, which he considered was an important sign in the diagnosis of insular sclerosis. After that other symptoms of the disease had set in.

Sir J. W. Moore, referring to Dr. Finny's remark, suggested that at a certain period in typhoid fever there might be structural changes in the spinal cord. Such changes are, however, of a transitory nature, for just as the heart suffers in zymotic diseases so also the spinal cord may suffer from a purely temporary organic change.

Dr. Craig, in reply, said that, with reference to Dr. Finny's remarks, he agreed that in severe illness, and, indeed, in many chronic diseases, structural changes might take place in the cord and ankle clonus and other symptoms be evinced. In answer to Sir George Duffey, the third case he (Dr. Craig) had referred to often got perfectly well for two years, and it was 16 years before it became clear that she was not suffering from hysteria, so that it was possible the recovery in Sir George Duffey's case might only have been of a transient nature. He would certainly regard true ankle clonus as of great significance, although it was regarded as a moot point whether or not it ever occurred in hysteria.

REMARKS ON SENILE DEMENTIA.

By CONOLLY NORMAN, F.R.C.P.I.;
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WE hear sometimes of senile insanity, and of senile mania, or senile melancholia—vague terms for mental affections occurring in persons who happen to be of advanced years. No doubt the age at which any ailment occurs has some effect in modifying its symptoms, but there is nothing sufficiently distinctive in the forms of acute mental disease affecting the old to justify us in applying to them any special epithet; neither does their prognosis lead us to the conclusion that there is anything in them that is specific.

It is otherwise with that form of mental disease which is truly incidental to old age, and to which alone the term senile should be applied. Senile dementia owes its popular names of dotage, or second childhood, to certain well-marked features, together with which must be taken its incurability.

But in spite of the ease with which its broad features may be often recognised, and of its hopeless prognosis, this affection presents certain points of interest often overlooked. To the philosophical pathologist it offers the study of a decay of function which is perhaps nearly akin to a physiological process. The morbid anatomist of the nervous tissues finds it associated with certain well-marked gross changes, which will have to be accounted for when the life history of the nervous system comes to be written, and hopes that it may one day help to shed light upon the dark places of nervous pathology and physiology.

It may therefore not be without interest to discuss briefly a few clinical points in connection with this affection.

Incidence : Sex.—The dementia of old age is more common among old women than among old men. The disproportion of the number of living members of each sex, as is well known, varies at different ages. At birth and in early life it is in favour of males ; in old age it is in favour of females. But beside the apparent excess of dotards among women, dementia senilis is disproportionately frequent in their sex. One reason at least suggests itself for this disproportion. The interests of women, if not generally narrower, are certainly in most cases more domestic than those of men. Women lose interest in life sooner. They rarely have any occupation which they can carry on into advanced age. As they grow old their husbands and children die, and they become on the whole more isolated than men. The mental faculties, therefore, rust sooner.

Incidence: Social Condition.—We are confirmed in the opinion just expressed by the curious circumstance that the intellectual classes suffer less than those who do not use their brains. The manual labourer, when no longer fit to work physically, usually ceases to work mentally. On the other hand we are all familiar with old men (and occasionally old women), who, even under conditions of extreme physical decrepitude, continue to exercise their intellect in the severe work of a profession or calling which makes perpetual demands upon the mental energy. It has often been observed that politicians, since they have ceased to drink as they did in the days of Fox and Pitt, are not only a generally long-lived body of people, but retain the capacity for severe and continuous mental work to a very advanced age. This is to all appearance due to the constantly fresh nature of their business. They have no time to yield to that intellectual idleness which is apt to come

to other men when old age puts a period to their ambitions and their struggles.

Incidence : Drink and Hardship.—The former especially tends to increase the liability to this disease. The influence of alcoholism in producing premature senility in all the organs is well known. It is not least marked in the brain. Cases in which senile dementia appears unusually early are often found to be cases of habitual drinking, and many cases which one at first regards as mere alcoholic amnesia, drift rapidly into a condition not distinguishable from senile dementia.

Incidence : Age.—To mention age in connection with a condition incidental to a certain period of life may seem superfluous. I merely do so to have an opportunity of pointing out that old age is often a relative term, and that one man is as old at 50 as another is at 70. It is not rare to find signs of senile mental decay in men whom, if one only judged by the number of their birth-days, one would call middle-aged.

Mode of Oncome.— The onset of senile dementia is commonly gradual. The slight progressive loss of mental agility, the increasing failure of memory common in old age, may for long be only noticeable by intimate friends and those who can compare the patient with his former self. These conditions generally deepen slowly, and it is often almost impossible to say when the limits of ordinary physiological senility are passed and the domain of distinct disease is entered. On the other hand, the oncome is often apparently rapid, or the disease which has been insidiously creeping on suddenly advances with great rapidity. There is considerable interest in these cases of sudden onset, which have hardly received, I think, the attention they deserve. The diagnosis of the true nature of the disease may be obscured by the unexpected nature

of its apparent beginning. As with other parts so, no doubt, with the brain. A great deal of work may be done by an invalid organ until some accidental or intercurrent affection reveals a weakness which has till now been latent, but from which recovery does not occur. Thus I have met cases in which some physical illness, severe or trifling, some moral cause of no unusual sort, has been the apparent starting point of a mental disturbance taking the form and running the course of senile dementia. Such are the following :—

CASE I.—A. B., an old man of great ability who followed an arduous calling with marked success, and showed no further sign of mental decay than a degree of failure of memory which seemed physiological, and which did not interfere with his work. He tripped accidentally and fell down a flight of steps, suffered from no indication of head injury or visible trauma, but was generally shaken and was much vexed at the occurrence which betrayed his failing strength. More from vexation than anything else he took to bed, and in a few days wandered in his talk and exhibited in an exquisite form the characteristic amnesia of senile dementia. He had forgotten his accident and, indeed, most of the events of the preceding half century. The condition of dementia persisted till his death.

CASE II.—B. C., an old lady who had been in frail health for many years, but was not noticeably enfeebled mentally, got an attack of influenza during which she became delirious. When the influenza passed off her mind did not clear, and she presented a typical condition of senile dementia.

CASE III.—C. D., an old lady, aged eighty-four, had been strong physically and mentally, exhibiting a slight failure of memory, chiefly in the form of telling the same story or asking the same question over again, but quite capable of attending to somewhat complicated business. She got an attack of typhlitis, suffered from delirium, and passed directly from the symptomatic delirium into a state of mental enfeeblement characteristically senile. She made an excellent recovery from the intestinal trouble, but the mental condition did not clear up.

CASE IV.—D. E., a man who, though always eccentric had been of great mental and physical vigour. He was a person of very strong family affections. When he was ninety years of age the unkindness of a favourite daughter caused an emotional storm, immediately after which he passed into a state of mental feebleness with entire amnesia for recent events. In this condition he remained till he died four years later.

CASE V.—E. F., female, a person who had retained to the age of sixty-four good powers of attending to business and a clear memory. She was worried by the misconduct of a son, was sleepless and fretful for about a fortnight, and then within a few days lost memory for recent events and became rapidly demented.

Of late years we not unfrequently see cases in which influenza is assigned by relatives as the cause of an illness which on examination turns out to be senile dementia. Of course, in such cases it is not always clear that there may not have been already a considerable amount of unnoticed mental enfeeblement. Similarly with moral causes. They are, perhaps, more often assigned than they fairly should be, yet I have been able to convince myself in many cases that domestic or business troubles accelerated the oncome of a disease which might otherwise have been delayed.[a]

[a] In this way, without doubt, some of the cases of insanity coming on after cataract operations are to be accounted for. The occasional occurrence of this association has been noted at least since the time of Dupuytren (Clinique Chirurgicale, 1828. The operation then referred to was couching). Sichel, recording (in 1863) eight cases occurring in patients of advanced years, attributes the affection to the influence of the dark room—alcoholism in some, not all. Magne (1863) blames the low diet usual in such cases. Laune (1863) mentions two such cases and considers them equivalent to the delirium nervosum of Dupuytren. Zehenter (1863) noted two cases, and Schmid-Rimpler, writing at the same time, supported the view that the dark room was an important element. Frankl-Hochwart (Jabrb. f. Pscych., IX., 152. 1890) summarises 31 cases of psychoses after eye operations—mostly cataract operations. His conclusions are somewhat indefinite, but while he mentions that eye operations are dangerous on account of the close connection of that organ with the brain, and seems to think that the development of cataract

Certain Symptoms : Restlessness.—Marked general excitability often ushers in the disease, and the senile dement often remains fussily active for a long time. The power of fixing the attention is gone, as is the memory, and the patient generally undoes anything as soon as he has done it ; while his irritability of temper and suspicion prevent the carrying out of many of the notions of the moment ; but motor restlessness may be a marked symptom, and sometimes gives trouble to those who have the care of these patients. Bucknil, long ago, rightly remarked that senile dementia generally attacks those who have been physically strong, no doubt because the physically feeble die of some other ailment before time has worked its special changes in the brain. So the senile dement is often much more vigorous muscularly than most men of his age. Hence when he is restless he requires more careful management than would at first appear necessary.

Many senile dements who are apathetic during the day, are extremely restless at night. Insomnia is apt to be a troublesome symptom in all cases of insanity occurring in the old, but there is a special tendency to nocturnal excitement in senile dementia.

Certain Symptoms : Hypochondriacal Delusion is not infrequent, and when it exists has often a grotesque and extravagant form, recalling the frequent hypochondria

and glaucoma in some specific way predispose to insanity, he refers a certain number of the cases to old age and concludes that the most important element is the dark chamber. It is evident, however, that the last is a very insufficient "cause" of insanity ; it can only be at most a contributing agency. The most recent contribution to the subject is that of Löwy (Zeitschrift f. Psych., 52, 167. 1896), who concludes that insanity after cataract extraction must be distinguished from senile dementia, mental disintegration being much less profound in the former. Yet he suggests a moral cause, such as we know often enough appears to be the starting point of the latter affection. Old uneducated people come to the ophthalmic clinic expecting immediate restoration of vision, instead they experience a protracted confinement in the dark chamber.

of the general paralytic. A similar variability—hypochondria mixed with delusion of the melancholic type, interrupted by episodic excitement of the maniacal form—is to be met with in both affections. As in general paralysis, so in the disease under review; these delusions often reach the height of negation (no bowels, no body, no head, and so on).

Certain Symptoms : Suspicion.—In very many cases of senile dementia marked notions of suspicion are prominent. They form a clinical picture intermediate between the panphobia of the melancholic, and the persecutory ideas of the paranoic. Organised delusion of persecution is rare or probably unknown. General feelings of injury and impediment exist. Vague notions that things are going wrong, and that everyone is against him, torment the patient. Perhaps the panphobic form is due, as in melancholia, to a sense of change. A constant and true consciousness of alteration, which the patient interprets as an external change, produces a dread of everything. The tendency to suspicion may be supposed to be, in this condition, equivalent to a loss of recent acquirements. The later social and altruistic feelings are lost, while the earlier mental faculties of self-preservation remain, and being uncorrected give rise to these notions of danger of injury. Unfortunately this explanation does not suit particularly well with the origin of ideas of this class in the affection in which they are most common—ordinary paranoia—nor does it fit at all with the facts of that other great affection or group of affections, in which there is a successive loss of the latest acquirements, namely, general paralysis—for in general paralysis delusions of suspicion, though by no means as rare as has been supposed, are not very common, and are not at all characteristic. The explanation may nevertheless contain some element of truth, for absolute symmetry is not to be

found in mental decay, and there certainly is a connection between the mental desolation of the senile dement, destitute of recent experiences, and living in a world that is, as it were, foreign to him, and his general tendency to suspicion.

A very special form in which suspicion is apt to appear is the dread of being robbed. This is no doubt in part connected with loss of memory. The senile dement forgets the disposition which he has made of his property, forgets where he has put his valuables or hidden his cash, and so readily takes up the notion that he has been robbed and ruined. In many cases, especially those in which there is an exacerbation at night, a dread of burglars, house-breakers, midnight murderers, and the like specially troubles the patient, and forms his pretext for restless nocturnal wanderings. Thus, one old gentleman, living in con-ditions of unusual security, nevertheless got up several times every night in order to be sure that his gun was under his bed and his sword fastened to his bed head. Another who kept his ready money stored in a box in his bedroom, contented himself by day with bitter complaints that his family rifled his box, but at night, becoming im-pressed with the idea of danger from burglars, walked about the house for hours with a drawn sword in his hand.

Certain Symptoms: Fabulising.—The tendency to fabulise[a] which has been often noted in alcoholic dementia, and which is very frequently associated with Korsakoff's dis-ease (polyneuritic insanity), is sometimes found in senile dementia, though rarely, and perhaps not in cases which have not been complicated with alcoholism. Thus in a senile case which I had under observation some time ago in the Richmond Asylum, the patient being assaulted by a

[a] Probably the most convenient designation for that condition, seemingly rather of pseudo-reminiscence than of delusion, in which the patient with apparent conviction tells a story, not in itself unreasonable, but absolutely unfounded.

violent maniac and receiving a bad black eye, accounted
for his disfigured condition next day by telling a story,
with all the appearance of conviction, of how at a particu-
lar hour he was walking in a particular thoroughfare, and
that a man came quickly down a bye-way, and running
against patient, got angry, and struck him without further
provocation. He described minutely the appearance and
dress of his assailant. Later in the case the same patient
became liable to epileptiform seizures. For many hours
after recovering consciousness he suffered from severe head-
ache and general malaise. This condition he used to account
for by confessing, with tears of penitence, that his master
had allowed him out the day before, and that he had taken
too much drink. (He had been a butler by occupation.)

In the same way I have noticed rarely, and only, I
believe, in cases where drink had been an element in
hastening decay, a suggestibility similar to that so common
in the drunkard. Of course the disintegrated mind of the
dement is not capable of long retaining suggestion.

Certain Symptoms : Amnesia.—The most usual character-
istic feature of the affection is the peculiar form of amnesia
which exists therein. Briefly, it may be said that memory
for recent events is impaired to obliteration ; memory for
distant events being relatively intact, or even over active.

There are special points to be noted about this impairment
of memory. Like the amnesia of the alcoholist it is often
not very apparent to a superficial observer. One is some-
times struck by the conflict of evidence as to loss of memory
in the cases of disputed wills of old men. In such a case
the patient will often smile and look pleasant, and hold for
a while a casual conversation with a friend without any
self-betrayal, without rendering it apparent that he does
not know who the person is to whom he is talking, and
without letting the other see that he does not know where

he is located either in time or space. Again, the same result may follow from the variability which, though less marked in this than in most forms of mental disturbance, still occurs often enough.   Considered theoretically senile dementia, being a state of irreparable destruction, ought to be invariable in the phenomena it presents. Nevertheless, and although there is no recovery, and although the course is on the whole downward, there may be remarkable variations of memory and of lucidity within short periods. Thus, in one case a patient remonstrated with his physician for visiting him, believing (wrongly) that the visit was for the purpose of certification, and saying that such a thing would injuriously affect the prospects of his family. Within a few hours earlier, and within a few hours later, he did not recognise his children, wondered who these strange young people were, and did not even seem to know that he was married.   Nor was this an example of a lucid interval, for at the same interview with his medical friend he did not know the approximate date, and he did not know clearly where he was.   One old man was in the habit of discussing his business affairs with his wife, with perfect apparent knowledge of who she was, though with many suspicions of theft on her part.   Yet from time to time he forgot her, tried to exclude her from his bedroom, and consulted a friend as to how he could get rid of her, being under the belief that she was a woman of improper character who had come into his house for the purpose of levying blackmail upon him.

The forgetfulness of recent things is perhaps purely attributable to general mental enfeeblement, to loss of power of receiving and of retaining impressions and experiences, but I venture to think that the comparative activity of images of events long past requires some further explanation. If there only existed an incapacity to receive and retain impressions,

the result ought to be mere dulness and apathy; but this is not the special characteristic of most cases of senile dementia. On the contrary, the senile dement is apt to talk and think feebly indeed, but constantly and unrestingly of the events of the long past, often of the events of early childhood. Some explanation is needed of why these are called up at the same time that later experiences are forgotten. The one process does not logically seem to be necessarily connected with the other. What causes the sudden projection of ideas long dormant—ideas which would with difficulty have been recalled had the patient retained normal health, nay, which probably could not have been voluntarily recalled, having been for years apparently irrevocably forgotten? In the normal state it occasionally occurs that recollections of childhood long quiescent return with startling vividness in dreams, especially during illness. I believe the same thing has sometimes been noticed in the delirium of fevers. A medical friend, in whom I have confidence, had a curious experience when under the influence of ether. The anæsthetic was administered very cautiously and too slowly, and while passing under its effects the patient had a series of vivid visions like hypnogogic hallucinations. The latest of the series (or, at least, the latest as seemed to his subsequent recollection) was an image of one of his brothers as a young child. The appearance of the vision was accompanied by a very distinct auditory hallucination. The image of his brother gave utterance to two perfectly unmeaning words, which the subject seemed to hear very clearly and in a loud ringing tone. Subsequently, when he recalled this occurrence, he recognised one of the words, but could not for several days recognise the other. He finally recognised this word also. Both the words were items of a sort of code of jargon which the children had invented to communicate with each other when they were

in the presence of persons whom they did not wish to enlighten. My friend is convinced that he had not thought of those words or this dialect for at least thirty years. One of the words he could only trace after long efforts to recall the various subjects dealt with in the code and the corresponding jargon.

It would thus appear when the present consciousness is dulled there may revive in sleep and in various morbid and toxic conditions images which in normal states would be incapable of resuscitation. Probably some similar order of events occurs in senile dementia.

Certain Symptoms : Aphasic and Paraphasic states are commoner in senile dementia than has been up to the present recognised.[a] The forgetfulness of proper names, the misuse of substantives, and finally the almost complete loss of these parts of speech which occur in many cases closely resemble ordinary aphasia.

Mrs. C. D. (Case III.), above referred to, talked volubly, often using wrong words; sometimes she forgot a noun and exhibited much irritation. If she did not soon find a word (it was rarely that

[a] I have found few references to this subject in psychiatric literature. The fullest is that of Schüle (Klinische Psychiatrie, 3rd Edition, 392). Ziehen (Psychiatrie, 1st Edit., 442), comparing senile dementia with general paralysis, says that hesitation of speech is almost never present in the former, but that aphasic and paraphasic disturbances are more frequent. Salgò (Compendium der Psychiatrie, 4th Edit., 316) speaks of aphasic troubles connected with cortical and meningeal hæmorrhages in senile dementia. Kräpelin, in the last (1899) edition of his text-book, speaks of the loss of substantives and peculiar failure of speech showing traces of aphasia. But a much earlier writer seems to have recognised this condition very clearly. Durand-Fardel (Traité pratique des Maladies des Vieillards, p. 33, 2me Edit., 1873) says—"Sometimes there is added to the disturbance of intelligence an alteration of speech, a true aphasia. We have seen two cases in which words seemed forgotten. The patients endeavoured in vain to reply; if some syllables escaped from their mouth they repeated them without varying, or they even repeated the last word or the last syllable of words which had been addressed to them." This description occurs under the rubric of the delirious type of cerebral congestion in the old, but the entire of Durand-Fardel's picture leaves no doubt that he is describing the excitement of senile dementia.

of which she seemed in search) she broke out into perfectly unmeaning sounds, a sentence or two of mere gabble, not words, but sounds with an intonation like words. When a wrong word occurred in an ordinary sentence it was sometimes evident for what it was intended, as there was often very slight similarity in sound. Thus she spoke of Captain A. :—" He joined his risk in England," for " regiment." She called her pulse her " pupils," and it was only on repeated suggestion from her nurse that she recognised the word " pulse." She grumbled, " Everything is wrong ; they don't know what to do ; look at that (pointing at the fire which had gone out)—look at that undisciplined grate."

CASE VI.—Another case (X. Y.) was observed to talk gibberish at times, from a very early stage of her illness. When I saw her she often forgot words and became violently irritated thereat. She got into curious tangles, beginning a sentence, dwelling on a word and repeating it, and then losing the thread altogether. She said :—" I am very—am very—I am very— very—very "—and then " confused " being suggested to her, she went on, "I am very diffused." Questioned about her sons, she said :—" One is abroad in India—great names and money—lords and princes ; one is in the South, in the Count (County) Cork—the *claim* of the place is B. ; another has a great deal to do ; is a big— big—big "—(" business " suggested) "Yes, a big business in Italy."

In the case of E. F. (Case V.), above referred to, when I saw the patient she presented an intelligent expression ; she rose as I came into the room, greeted me smilingly and courteously, and called me doctor, so far seeming to recognise her surroundings. Nevertheless, though in Dublin, she thought she was in the provincial town where she had lived many years, and she did not recognise her daughter who was with her. She replied to questions often with an intelligent air, generally quite from the purpose, though sometimes in a connected sentence. From time to time used wrong words without seeming to notice. Again stuck fast, apparently through forgetting a word, mostly a noun. Again she repeated a word over and over as one sometimes finds an aphasic do. Thus, asked what was the matter, she began to describe how she went out to drive the same morning, and then said—" And the matter, the matter, the matter, the matter, the matter." Sometimes she seemed conscious of her state, and said, " I don't understand

you." Asked her age, she bridled up and said, "I do not like to say." Being promised only easy questions, and then asked her name, she replied correctly, and added, "That *is* an easy question." She could not tell the current year (1899). When I suggested "Eighteen hundred and ——," she said, "Eighteen hundred and six." I asked her in what year her husband died, and she replied, "Sixteen hundred and six years." Asked how many years it was since her husband's death, she counted aloud, "One, two, three, four, five, six—six years" Answered in the same way the number of her children. When she did not deal in this way with figures she answered incorrectly. Some of her words appeared to be mere paraphasic gabble. Thus asked what her husband died of, she replied, "Kyrax of extinguish," which she repeated several times. Neither did she seem to recognise nor to understand the word apoplexy when suggested to her. Asked how she had come to where I saw her, she replied, "I drove in a daminett." Asked from where, replied, "From Ballarett." In this case it was possible to test for alexia, and a condition of pretty well-marked paralexia was found. I gave her the *Daily Nation* newspaper to read, and she held it before her face and looked intelligent, her lips moving, and so on. Being pointed out the title, and asked to read it, she said readily, "The Daily," and stopped. She tried to spell the word Nation—M-a-y-l-l-l-m. I spelled the word correctly for her, with her apparent assent, and pronounced the whole title for her several times, and asked her to pronounce it. She said, "The Dammanation." I then tried her with "Price one penny," also printed large. She mumbled, and seemed unable to manage it at all, so I spelled p-r-i-c-e, price, &c., and then she read:—"I—I—I am a nation, I am a price."

She did better with a book, but exhibited the same general peculiarities, similar to paralytic alexia, dropping words, sub-stituting others, harping on one word over and over again. When started, however, she babbled on contentedly, reading much faster than she spoke, and with good emphasis.

The following is the passage :—

"'You were always a kind-hearted boy,' said Frank, gratefully. 'Miss Clauson, do you think I could learn to ride?'

"'You are too lazy, I fear.'

"'Yes; I suspect I am. I won't trouble you, Purton. Goodbye.'

"The horses trotted on, and Frank sauntered back to Hazlewood House, smiling placidly.

"In the afternoon, to Miss Clauson's supreme astonishment, the new purchase arrived. She and Frank were in the garden at the time. The bay was placed in Mr. Giles' charge, and that personage, after inspecting it, rejoiced for two reasons—the first, that Mr. Barker had not 'bested' Frank; the second, that even if Frank had 'bested' Mr. Barker, the horse must have cost a pot of money, and at whatever figure his (William's) introduction might be assessed, the backsheesh must be worth having.

"'I thought you didn't care for riding," said Beatrice.

"'I don't—much.'

"'Then why buy such a horse?'

"'Because I should like to ride with you.'

"He gave her one of his quick glances. Beatrice turned away, ashamed to feel that she was blushing. She was very cold and reserved during the evening, yet the audacious young man choose to take it for granted that she would accept him for her cavalier, *vice* Purton superseded."

And this is her rendering thereof :—

"You were always a kind-hearted Frank. You are too lazy I fear. Yes I won't trouble Burton Purcell. The horses trotted Frank and bank solid horses wood good pot of money purcell burton which you see must be worth. Frank and shutters up were in the garden solid wood (here voice got low and mumbling, and could not be followed).

"He gave her one quick. Burton turned away covered with blushes. She was blushing. It was very cold that evening and yet (mumbling as above). Burson proceeded."

Certain Symptoms : Disorientation.—The tendency to disorientation, which is probably always present in senile dementia, is interesting from a semeiological point of view, and also in connection with aphasia and alexia. Nothing is more remarkable as a symptom than the frequency with which a patient will deny that he is in his own house, that the furniture about him is his own, &c. It is not strange that this should happen if the patient has lately changed his residence, for his want of recent memory may seem to account for it, but it occurs when the sufferer has dwelt all his life in the same place. A

very common notion is that the house is a lodging-house, or an hotel, or a friend's, and the patient will say, " I cannot stay here any longer, I cannot afford it ; " or, " I am trespassing too long on these people ; " or, " I must go home and attend to my business." To desire to go home, to get away out of this strange place, is not infrequently assigned as a reason for the patient's restlessness, but an entire absence of orientation may occur in a case in which restlessness is not marked. Some such patients, too, seem to think they are at home when they are really away from home, or even in an asylum. Some patients lose their way in their own garden, or even in their own house. Few can be trusted alone in a town. They forget their way, they forget the name of the street, they even forget the appearance of their own house, and pass it by without recognising it. These conditions appear not to be analagous to disorientation arising in connection with maniacal, confusional or paranoic states, but rather to depend upon a form of asymbolia, and to really consist in an incapacity to understand the nature of one's surroundings. I have noticed disorientation most frequently in individuals who showed paraphasic symptoms, and who made errors as to personalty. Thus, in a certain patient, one of the earliest observed signs was a tendency to read nonsense (*i.e.*, misplace and misuse words) when reading aloud to his family, as had been his custom. Later on he was paraphasic in conversation, and his disorientation was remarkable. He was found on one occasion sitting on the door-step of the house next his own, crying because he could not find his way home. He could not remember the number of his house, nor even the name of the street, in which he had lived for years. Partly conscious of this condition, he caused his address to be written in full in his notebook, but this did not help much, for he sometimes

did not remember his notebook, and when he did he often failed to recognise the entry made therein. At times he could not find his cigar case. He emptied his pockets, and rummaged over their contents, taking his cigar case in his hands several times, and continuing to search for it. Sometimes, though anxious to smoke, he could not light his cigar through sheer inability to understand the use of a match. At other times he would call loudly for a cigar while he was actually holding one in his hand. He had a habit of filling his pockets with empty used envelopes, and posting them in street pillars or shoving them into private letter-boxes as he passed by. On some occasions he gathered up visiting cards, and brought them to his wife, with a request to stamp and post them. The failure to identify common articles, or their imperfect identification, seems here to very closely resemble the failure to identify names in aphasia, or the misuse of words in paraphasia, and to be rather classed as asymbolia than as mere loss of memory.

In a case already referred to (X. Y.) the patient frequently urged her friends to bring her home out of these lodgings, and when they tried to remind her that she was in her home, she used to reply—" That cannot be ; these things are not mine ; the pictures on the walls are strangers, the furniture is not mine," and so forth. Mistakes as to personalty are not always to be accounted for solely by loss of memory. Thus a patient will confound one of her children with another, not merely confusing the names, but mistaking the individuals, though able at the same time to describe the different persons with general accuracy. I have a case under notice in which an old man not only forgets his daughters but from time to time points to them and asks—" Who are those young men ?" His vision is good. He is apt also to say—" We have been long enough

in this hotel; we must go home," though he has lived for some years in his present residence.

Certain Symptoms: Sexual Excitement.—A common symptom in early cases of senile dementia is a tendency to sexual excitement, often showing itself in rather disgusting ways—by exposure, by indecent liberties with children, and so forth; or merely indicated by a silly tendency to talk unreservedly of sexual matters. Whatever form the excitement takes, there is a general character of fatuity and want of vigour.

Various attempts have been made to account for this condition. Some authorities talk vaguely of an irritability connected with the involution of the sexual functions. I am not sure whether this means anything. If it does, the assumption that the mere progressive decay of certain organs is accompanied by excitability of function seems by no means self-evident. There may be some analogy between the recrudescence of sexual feelings and the revival of the long-forgotten thoughts and ideas of childhood; but this is not clear, and certainly the old man does not return to the same notions of sexual matters which occur in the child before puberty. It is probable that the sexual proclivities shown in the senile state are simply due to those residual feelings originating in the sexual nerves, which most likely never become absolutely extinct. These are uncorrected by the weakened judgment, and, the mass of memories and experiences which serves as the guide to action being forgotten, indulgence of the excitation of the moment follows.

———————

DR. NINIAN FALKINER inquired if there was generally albuminuria in cases of senile dementia, and asked if it was a fact that there was a train of mental symptoms in chronic Bright's disease closely resembling those of senile dementia.

Dr. LAW said he had a little experience of asylum work in England and afterwards in British Guiana, and a point that struck him when in the latter place was the large number of cases of senile dementia in comparatively young subjects, where in this country they would expect an attack of more active mental disease. He also noticed that cases of that kind were commonest in the lowest races in the colony.

Dr. NORMAN, in reply, said that albuminuria and kidney disease associated with senile dementia was only what they might expect, for though he could not subscribe to the theory of some nervous pathologists that senile dementia depended wholly upon arterio-sclerotic conditions in the brain, it was undoubtedly true that gouty kidney and extensive arterio-sclerosis were common in persons dying of senile dementia. Consequently the two conditions—mental disturbance and albuminuria—co-existing would not surprise him. Various conditions of mental disturbance have been described as the insanity of Bright's disease, but there is no special form. With regard to the racial question, Dr. Law's remarks bore out his statement that the more the brain was used the less the probability of the occurrence of senile dementia.

ON THE ACCENTUATION OF THE SECOND SOUND IN THE PULMONARY AREA. SKODA'S SIGN.

By JOSEPH O'CARROLL, M.D., F.R.C.P.I.;
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IN medicine, more than in almost any other branch of natural science, facts accumulate and theories disappear. Destructive criticism is a necessary force in scientific progress, and this must be my excuse for asking for a reconsideration of Skoda's theory of the accented second sound; even though the weight of authority has been on its side for fifty years. "When," he says, "the pulmonary artery is abnormally distended, which it always must be when the pulmonary circulation is obstructed, its second sound becomes very loud. . . . The pulmonary artery when thus distended presses with increased force upon the blood within it, and consequently the backward stroke of the column of blood against its semilunar valves becomes more forcible." This is anent aortic incompetence. Again, in discussing mitral insufficiency, he says " the second sound of the pulmonary artery is increased, and the accent falls distinctly upon it." In mitral stenosis, " the second sound of the pulmonary artery is increased."[a]

This observation and explanation of Skoda's have been accepted, practically without reserve, by almost every subsequent authority in English medical literature, and, so far as I know, are equally uncontroverted on the Continent. Yet, I cannot help thinking that the statement of fact is not by

[a] Skoda. A Treatise on Auscultation and Percussion. 4th edition. Translated by Markham. 1853.

any means a complete one; and I shall offer reasons why the explanation does not seem to me to be reasonable. So far as I can find Skoda's reasoning on the point is wholly *à priori,* and may, I think, fairly be stated thus :—*In many cases of disease involving the left side of the heart, the second sound is heard with marked clearness and even accentuation at that spot on the chest wall at which the pulmonary artery comes nearest to the surface. The sound is therefore in the pulmonary artery. Disease of the valves of the left heart induces a tendency to more or less delay in the circulation through the lungs : the pulmonary system is in fact over-full; there is therefore a condition of engorgement of the pulmonary artery, and consequent slamming, so to speak, of the pulmonary valves, indicated by an exaggerated noise or accent.*

With regard to the first conclusion in the foregoing statement, it will be granted, I think, that a vascular murmur heard on the surface is not necessarily produced by that vessel which happens to be most superficial at the point of observation. Without elaborating this point too far, I need only point out that the pulmonary artery is closer to the surface than the aorta in the mid-sternal line and even at the right border where one would make no difficulty about calling a systolic murmur an aortic one; and with regard to the diastolic basal murmur, that it is frequently best heard in the lower part of the so-called pulmonary area, in the third left interspace, and that no one would think of concluding from that fact alone that such a murmur indicated an incompetence of the pulmonary valves. The argument from position seems to me to receive its *coup de grace* from the fact that, although at the " pulmonary " area the pulmonary artery is superficial to the aorta, yet the valvular orifices are very nearly in the same plane, one of them actually overlapping the other, so that the mass of the pulmonary artery and conus arteriosus

forms an admirable medium for the conduction of the aortic sounds to the surface.[a]

With regard to engorgement of the pulmonary vessels as a cause of increased recoil in the pulmonary artery and slamming of the pulmonary valves, I think the argument *à priori* is equally weak.   Other things being equal, the loudness of the diastolic note will be in proportion to the amplitude of the recurrent wave from the periphery in the pulmonary artery.   But in mitral incompetence or stenosis the pulmonary artery tends to be still fuller than it is in health, and in health it is, as the physiologists teach us, somewhat distended or overfull.   In disease of the mitral valve, therefore, the artery wall is stretched in the presystolic period nearer to its limit of elasticity, and therefore its range of post-systolic recoil is more limited. That is to say, that the amplitude of the recurrent wave will be less than normal, and the intensity of the second sound should be correspondingly diminished.

But theoretical considerations such as the preceding have no value compared with the results of actual observation. Let us see, then, whether there are any practical objections to Skoda's theory.   In the first place I point to the fact that this accentuation is absent in many cases in which, according to the theory, it ought to be present : Thus it is by no means common in emphysema of the lungs ; nor in phthisis, unless a consolidated piece of lung intervenes between the base of the heart and the thoracic wall ; nor is it heard usually in aortic regurgitation (notwithstanding Skoda's statement to the contrary), even though there be

[a] It is misleading, it seems to me, to speak of the second right inter-space as the aortic and the second left as the pulmonary area.   This localisation had a value for the distinction of aortic from pulmonary *systolic* sounds ; but when we come to diastolic murmurs it has no value at all ; and I am inclined to think that even the ordinary second sound in the normal heart is better heard at the left border of the sternum than at the right.

signs of delay in the pulmonary circulation; nor even in aortic regurgitation when mitral incompetence has been superadded; nor indeed is it present in all cases of mitral disease anterior to failure of compensation. Again, the accentuation is present in a considerable number of cases in which there is not the slightest reason to suspect either heart disease or any tendency to delayed pulmonary circulation. Thus it is commonly present in children, in neurotic persons, in chlorosis, and at the beginning of fevers. Finally, I shall make brief mention of three cases in which the accentuation disappeared, and the second sound became very faint coincidently with the supervention of a diastolic aortic murmur, thus indicating, in my opinion, that the so-called pulmonary accentuation was really aortic.

CASE I.—R. O'C., aged thirty-two, Whitworth Hospital, 1896, mitral regurgitation and accented second sound : while under observation he developed a systolic aortic murmur, and a little later a short diastolic murmur became audible. At the same time the "pulmonary" accent, and indeed the second sound in that area, disappeared, and the only second sound of pure character which we could find was a faint one at lower right border of sternum. The necropsy confirmed the diagnosis.

CASE II.—E. D., aged eleven. Purpura with endo- and peri-carditis (malignant.) Admitted to Children's Hospital, 10th September, 1896, under care of a colleague, who noted "loud mitral regurgitant murmur, with accentuated pulmonary second sound and hypertrophy of left ventricle." She came under my care about the middle of October. I examined her carefully on the 21st and 23rd, and found the mitral murmur, and also a double aortic murmur, but not a trace of any pulmonary accentuation, and in fact no pure second sound at all, notwithstanding that the increased bulk of the heart had pushed aside the lung. I had her examined again by my colleague, on whose accuracy in clinical observation I place the greatest value; and, though he accepts Skoda's views, he corroborated my observation as to the almost complete disappearance of a sound which a few weeks before had been intensified. The diagnosis as above was confirmed by necropsy.

Case III.—Mrs. K., aged forty-two, was under my care in the Whitworth Hospital in 1897 with presystolic apex murmur and thrill, and "second sound accented in pulmonary area." Re-admitted recently, and still under my care; she presents a short systolic as well as the presystolic apex murmur, but the accentuation in the pulmonary area has given place to a very faint second sound, with which is heard a soft murmur. I am driven to conclude that whether by reason of a sclerotic process ascending the anterior mitral valve into the aortic valves continuous with it, or of an independent valvulitis, she has now a slight aortic regurgitation murmur replacing the original aortic accent.

These cases indicate the direction in which I look for an explanation of the sound under discussion; though I am far from maintaining that the pulmonary artery takes no part in the production of the second sound—for in Cases I. and III. I am prepared to accept the faint second sound as mainly, if not entirely, pulmonary—I am slow to believe that the vigorous second sound of early mitral disease is mainly pulmonary. In my view it is produced at the aortic orifice as the result of increased amplitude of the recoil wave in the systemic arteries: the increase in the amplitude being caused either by diminished quantity of blood thrown into them by a vigorous ventricle, as in mitral disease, or by diminished vasomotor tonus, as in children and neurotic adults, for instance. An examination of the radial pulse in these cases will usually show that it is soft, rapidly dilating, and rapidly contracting; it might be called a resilient pulse, or a "puerile" pulse, from the absence in it, as in the child's pulse, of any hint of continued tension.

If this view of its causation be accepted, the accented second sound might help us, in addition, of course, to other and I confess much more valuable criteria, to recognise and, as it were, delimit three stages in an ordinary case of mitral disease. In an early stage there may be simply the murmur, without any accentuation of the second sound or

any other sign of lack of compensation. Later on the second sound may be accented—if transitorily, without much morbid significance; if constantly, indicating diminished systolic influx into the aorta from a vigorous ventricle or relaxed vasomotor tone. Finally, the intensity of the second sound diminishes from supranormal to subnormal in proportion as an impeded or engorged venous circulation offers more and more resistance to the arterial flow; in fact, as the condition of the general circulation begins to resemble that which had been established earlier in the pulmonary area. Given, then, an accented second sound, constantly present, I should assume it in almost all cases to be of aortic origin. The next question is, whether it is functional as in children, neurotics, and chlorotics, or due to increased facility of conduction, as by a condensed edge of lung or increased bulk of heart; or is it to be referred to an organic heart disease? Assuming evidence of the last condition present, I should fear that my patient had entered upon the stage of more or less precarious compensation.

It may fairly be asked, how much farther do we get by this view of Skoda's sound than by the older one? To which I answer, that the former theory has never enabled us to recognise mitral disease without the presence of a murmur, nor to predicate moderate compensation unless the signs of non-compensation were absent. It is a link in a vicious circle of reasoning, of which I could give very recent examples. It was deduced *à priori* from the impeded pulmonary circulation, and was offered as a proof that the pulmonary circulation was becoming impeded. Finally, as I have striven to show, it does not respond to facts, and fails to explain accentuation without heart disease.

The aortic theory, on the other hand, gives us a fairly clear conception of the conditions present; it is useful for other cases than those of heart disease, and it is not

inconsistent with facts. It brings some evidence to bear on three important points : the efficiency of the left ventricle, the quantity of blood thrown into the aorta at the systole, and the resiliency of the artery walls. Finally, it does not mislead us into the baseless and dangerous conclusion that the compensatory activity of the right heart can be measured by the intensity of the second sound in the so-called pulmonary area.

ON THE EXAMINATION OF SICK CHILDREN.

By LANGFORD SYMES, F.R.C.P. (IREL.), &c.;

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Physician to the Homes for Destitute Children, and to the Convalescent
Home, Stillorgan.

THE clinical examination of sick children differs in some respects from that of adults, and as their diseases, symptoms, and treatment are in many ways diverse, it occurs to me that it might be useful for us to consider to what special points in their case particular attention should be directed—what peculiarities strike the physician in his visits to the children's ward.

Young children never know the seat, nature, or cause of disease. Their friends often mislead one, being themselves in ignorance, and so its discovery is entirely dependent on the physician's powers of physical examination. Hence it necessarily follows that *every organ* should be examined.

With adults we have intelligent speech to help us, a reliable and usually sensible patient to question, a sick man who knows the beginnings, if not the cause or seat, of his malady, and who may even guide us as to its best mode of treatment. All these being withheld in childhood and infancy, the diagnosis is consequently more difficult.

I do not think it matters much in what order we take the organs for examination, provided that they are all carefully scrutinised; but it does seem desirable that in the younger infants some routine method should be adopted, for to this it will be found easy and wise to adhere afterwards. Some organs are, I believe, better kept to the end, and certain points easier to note early. A little study of these questions teaches us what to avoid. First, delay must be avoided; the examination must be made very

quickly in some instances, else it will not be permitted at all. Roughness must be avoided, for a rough or heavy handling will reveal very little. Again, interruptions should be avoided; once we have examined a child it is a very bad practice to be obliged to return to attempt a review of some organ previously omitted. Moreover, this will be frequently resisted. It should, therefore, be complete.

The method or routine which I have been led to adopt, and find useful, has this advantage at least, that once the physician's hands are laid upon the child the whole examination can be gone through without their ever being lifted off.

In this procedure the child, if in bed, must be stripped quite naked and rolled in a blanket; and if in the outpatient department, for the first visit, should be undressed by a nurse in the ante-room, and sent in to the physician clothed only in a long flannel dressing-gown. (In every proper dispensary for children there is a dressing-room, through which the children pass, situated between the waiting-room and the physicians' consulting-room, all well heated.)

Before proceeding to examine any child it is of great importance to know the history. The following history is a rough sample of what should be obtained from the mother or person in charge, for the patient is quite unable to assist one. It differs in many respects from that obtained from adult patients:—

History.—What the child has been brought for? How long ailing? When last quite well? Beginning, cause, or progress of illness? If born properly or prematurely? Particulars of labour and condition after birth? (by this inquiry *premature birth, hæmatoma, visceral or mucous hæmorrhages, asphyxia, obstetric paralyses, umbilical conditions, septic*

infections, *icterus neonatorum, tetanus neonatorum,* or *mastitis* will be fully revealed). How long fed at the breast, and when first given artificial food? How much? How often? How mixed? When weaned? (by these questions we shall often discover the causes of some of the most fatal diseases of children—*marasmus* and *atrophy, rickets, scurvy, diarrhœa* and *dysentery, flatulent colic,* and *dilatation of the colon*). Commencement and progress of dentition? What previous diseases, and when? (especially we should inquire for *thrush, rashes, snuffles, diarrhœa, fits* or *convulsions, whooping-cough, mumps, diphtheria* or *croup, rheumatism* or *growing pains,* and infectious diseases). How many other children living? Their health? Children lost (causes)? Miscarriages? (for *syphilis*). Mother's health and history? (especially for *rheumatism, syphilis,* or *tubercle*). Father's health and history (*rheumatism, syphilis, tubercle*). And, lastly, the hygiene or sewerage of the house?

All these particulars throw a vast amount of light upon the case, and should be in writing on the note-sheets at the head of each child's bed, and obtained by the clinical clerk on its admission from the mother or friend before they are allowed to leave the hospital.

EXAMINATION.—The following order is recommended:—

I. " FACIES."—The general appearance of the child is to be first noted—pale and anæmic, florid, sallow or jaundiced in complexion; fat and well-nourished, or pinched and wasted; well-developed or dwarfed; joy or sorrow; pain or ease. The attitude, if at ease, distorted, choreic, paralytic, or anywise crippled. The gestures; how it receives objects, &c. Its sanity and intelligence, and state of cerebration (*idiocy, cretinism, moral insanity,* or *mania* will be evident). Conscious or comatose (drowsiness and stupor in children may result from *uræmia, epileptiform convulsions, organic cerebral disease*—such as hæmorrhage,

effusion, abscess, or tumour; *hydrocephaloid* condition in *summer diarrhœa, ptomaïn* or *food poisoning*, formerly called gastric attacks, and sometimes from *pneumonia, drugs*, or *alcohol*). If it cry or cough the voice will reveal its pulmonary and laryngeal condition (for instance, it may tell us of *whooping-cough, diphtheria, laryngitis, laryngismus*, or *pneumonia*). Again, *œdema, cyanosis, skin affections*, or *eruptions* are at once obvious; also the rashes of *purpura, chicken-pox* or other infectious fevers. Respiration is visible. The physiognomy alone often reveals disease (*e.g., chorea, pleuro-pneumonia, meningitis*, "hippocratic facies" of impending death, *adenoids, Bright's disease*; wasting of *diarrhœa, atrophy*, or *marasmus*, with Jadelot's lines on the face; *inherited syphilis*, with its rash, snuffles, fissures, or "Hutchinson's teeth," &c.). The state of the ocular muscles and pupils is usually easily observed, and may reveal paralysis from *cerebral abscess, cerebral tumour, thrombosis of sinuses, tubercular meningitis*, or *diphtheritic paralysis*.

II. The child being now stripped, next pass both hands carefully over THE HEAD. Observe if sweating exists (as in *rickets*.) Note its size and shape—whether microcephalic, hydrocephalic, rickety or "natiform," with "bosses" or osteophytic nodes on the surface of the bones. The sutures may be prematurely closed (*microcephalus*), unduly patent (*hydrocephalus, rickets*), or grooved. The anterior fontanelle, usually closing about the eighteenth month, may be obliterated too early (*microcephalus*); widely open, with resilient attenuated edges (*hydrocephalus, rickets, cretinism, achondroplasia*, formerly called fœtal cretinism, and in some *dwarfs*); tense and prominently bulging (*meningeal effusion, hydrocephalus, cerebral tumour, whooping-cough, posterior basal meningitis, bronchitis*); flat or deeply sunken and depressed (*collapse, diarrhœa, cholera infantum*, "*hydrocephaloid*" condition, *wasting diseases, malnutrition*).

" Craniotabes " may be felt—*i.e.*, thinning of the occipital bones so as to yield under the pressure of the finger (indicating *syphilis*, *rickets*, *chronic hydrocephalus*). Measurements of the head are also necessary in some of its diameters in correctly estimating mental capacity.

III. The hands now pass down from the head and examine the entire FRAME, bones, and joints. The shoulders, arms, hands, fingers, chest, ribs, hips, legs, and feet (*rickets*, *scurvy rickets*, *rheumatism* with its *subcutaneous nodules*, *torticollis*, *clubbed fingers*, *deformities*, *joint affections* and *bone diseases*, *sarcoma*, *erythema nodosum*, *œdema*, *chilblains*, and *pseudo-hypertrophic paralysis* are thus at once observed).

IV. The REFLEXES are easily commenced next, as the hands are now touching the feet. Plantar, " ankle clonus," knee-jerks, cremasteric, abdominal, epigastric, facial irritability (for *tetany*), and ocular reflexes. The reflexes are a most valuable index to the state of the nervous system in infants, and *neuritis*, *chorea*, *diphtheritic paralysis*, *infantile paralysis*, *Friedreich's disease*, *meningitis* in its many forms, *spastic paraplegia* (cerebral paralysis), *birth palsies* and *hemiplegia* can frequently be differentiated thereby.

V. The EYES should now be scrutinised—pupils, *ocular paralyses*, vision, photophobia, nystagmus, &c. The EARS for *otorrhœa*, &c., and the NOSE for *snuffles* (a common sign of *syphilis*), ichorous discharges, depressions, *adenoids*, &c.

VI. The GLANDS are now commenced :—Parotid, cervical and submaxillary, thymus and thyroid, supraclavicular, axillary, and inguinal; showing perhaps *mumps*, *Hodgkin's disease*, *tubercle*, *sarcoma* or *new growth*, *syphilis*, *glandular fever*, or with an atrophied thyroid *myxœdema* or *cretinism*.

The hands will now lie upon—

VII. The ABDOMEN ; the gentlest palpation possible will

alone reveal its true condition.   First observing the INTES-
TINES we look especially for *abdominal tubercle, tubercular peri-
tonitis* with *bands of lymph, tubercular ulceration of the bowels,
enlarged mesenteric glands* or *tabes mesenterica, ascites, tumours,
intussusception, constipation* or *dilatation of colon.*   Next we
measure the LIVER by finger-breadths below the costal
arch and feel its edge.   It is relatively larger in infants
than in adults, while its diseases are not so common.
Then the SPLEEN may often be felt and measured.   En-
larged spleen in infants is common in *splenic anæmia,*[a]
rickets, tuberculosis, and perhaps *syphilis.*   The KIDNEYS
should also be sought for, and if felt some morbid condi-
tion has either enlarged or displaced them, as they should
not be felt in health, *sarcoma, new growth,* and *cystic disease*
here occur to the mind.

In connection with special abdominal diseases the RECTUM
must be examined, but as a routine practice it is not,
perhaps, required.

VIII. The HEART is now quite close ; see its apex beat ;
feel its impulse or thrill ; map out its area of dulness.
Enlarged area of cardiac dulness in children occurs in *chorea,
pericarditis, diphtheritic paralysis, rheumatism,* some cases of
congenital heart disease, and *whooping-cough.*   In an epidemic
of whooping-cough last spring I found a remarkable
increase in the area of cardiac dulness.   Appreciate its
sounds, and detect its murmurs—functional, organic, or
congenital.   Congenital heart disease consists of *patent
ductus arteriosus ; patent foramen ovale,* or, most commonly,
a deficiency of the ventricular septum.   It will be known by

[a] I would here remind you that splenic anæmia was first depicted by an
Irish observer, Dr. Francis Battersby, Surgeon to the Institution for
Diseases of Children in Pitt-street, Dublin, who published his careful
observations in the Dublin Quarterly Journal of May, 1849, as " Tumefac-
tion of the Spleen in Children."   Continental and English observers have
since confirmed many of his results.   It occurs amongst the wealthy classes
just as in poor children.

marked cyanosis and clubbing of the fingers; probably a loud, blowing systolic murmur; feeble apex beat; usually absence of thrill; an increase in the red blood corpuscles; and its occurring in a child under three years old, which is the average age of death.

What is termed *Eustace Smith's sign* may sometimes be heard at this juncture—*i.e.*, a murmur over the manubrium on bending back the head, usually indicating *enlarged bronchial glands.*

IX. The LUNGS are now beneath the hands—anterior, superior, sides, posterior. Especially look for *atelectasis* or *collapse, broncho-pneumonia*, with its miniature patches of dulness so difficult of detection, and *empyema.* *Tubercular lobular pneumonia* is also a very violent disease in children. Of all lung diseases, however, one of the most peculiar is that known as "*apex pneumonia.*" Very masked, resembling enteric fever, with delirium, convulsions, and very little to show, it is liable to be passed over. It was called from its delirium "cerebral pneumonia," but, as shown by Dr. Sturges, it is only because the other signs are less that the delirium is more striking.

The child will now for the first time be sitting up, and when the posterior portions of the lungs have been examined glance next at—

X. The SPINE. Test its curves, prominences, depressions, suppleness, or rigidity. Especially we must beware of *rickety curvature of the spine* distinguished from Potts' disease— by forming a wide curve, disappearing on lifting the child, and by being unaccompanied by pain or much stiffness. Also we must recollect *paralysis of the muscles of the back* from *diphtheritic paralysis, tumour of the cord*, or *anterior poliomyelitis.*

XI. The NECK is an important part of the spine. It reveals wasting in a child at once. Also *rigidity* of the neck

in children is a very striking symptom. It may occur in *tubercular meningitis, purulent meningitis, posterior basal meningitis, cerebellar tumour, enteric fever, diphtheria, apex pneumonia, wasting with dyspepsia, tetany, retro-pharyngeal abscess, cervical caries, rheumatism,* &c. When severe it produces retraction of the head and "*cervical opisthotonos.*"

XII. The MOUTH is now finally inspected. See the lips, gums, teeth, tongue, cavity of the mouth, palate, tonsils, and THROAT, and, if suspected, examine for *adenoids.* A host of diseases previously unthought of may be revealed in a child's mouth—*thrush, scurvy, stomatitis,* and *cancrum oris;* delayed or irregular dentition from *cretinism, rickets,* or *syphilis; retro-pharyngeal abscess;* also *follicular tonsillitis* and *diphtheria, laryngitis* and *laryngismus* may have to be differentiated.

This usually finishes the routine examination in ordinary cases, and is generally sufficient to establish a correct diagnosis, or, at least, reduce the difficulty to one of two alternatives. Thus in the passage of the hands from the head twice down and up the body, the fullest information can be quickly gathered from examination of the various organs *en route,* while the hands are never taken off the child.

XIII. Special investigation of the NERVOUS SYSTEM must, however, be afterwards conducted if any suspicion remains, or if·the foregoing examination reveal any nervous troubles.

The following are the chief points, being the same for both adults and children :—

1. Motor phenomena—*e.g., spasm, paresis, paralysis*—
   Power of shutting eyes, whistling, laughing, grinning or frowning ; power of co-ordination, threading needles, passing needle through a hole in paper, touching the nose, standing with eyes shut.

2. Reflex phenomena, especially seeking for *diphtheritic paralysis, infantile paralysis* or *neuritis.*

3. Sensory phenomena—*e.g.*, touch, pain, heat, cold.

4. Trophic phenomena, particularly regarding *pseudo-hypertrophic paralysis, juvenile muscular atrophy, birth palsies, infantile hemiplegia,* or *spastic paraplegia.*

5. Electrical phenomena.

6. Bladder phenomena ; control of sphincter. *Incontinence of urine* is often caused by *stone, phimosis, uric acid, worms,* or *organic nervous disease.*

7. Rectum phenomena, control of sphincter.

8. Mental capacity for *feeblemindedness, idiocy* or *imbecility, cretinism, moral insanity, mania,* and even *general paralysis of the insane* (of 72 cases collected under 20 years by M. Thiry, 29 were under 14 years of age).

9. Speech, for *backwardness, aphasia, nasal speech, stammering, idioglossia,* or even *dumbness.*

10. Power of sitting, standing, walking, reading, writing or singing. It is remarkable that in some cases of *cerebellar tumour* in children they can sing very well.

The nervous diseases of children form a large and interesting group, and the following must be specially held in remembrance :—

(Brain). *Tubercular meningitis, acute simple meningitis, posterior basal meningitis, cerebro-spinal meningitis, spastic paraplegia, birth palsies, infantile hemiplegia, hydrocephalus, cerebral abscess, cerebral* or *cerebellar tumour, tubercle of the brain* and *thrombosis of the sinuses.*

(Cord). *Infantile paralysis, Friedreich's disease.*

(Nerves). *Neuritis, diphtheritic paralysis.*

(Functional). *Convulsions, laryngismus stridulus, tetany, torticollis, myotonia congenita, chorea, epilepsy, hysteria, idioglossia* and *stammering, night terrors, pavor diurnus,* or *day terrors.*

(Mental). *Idiocy*, *imbecility* and *feeblemindedness*, *cretinism*, *dumbness*, *moral insanity*, *mania*, or even *general paralysis of the insane*.

Some other points in clearing up the clinical puzzles of children's diseases can be subsequently tested—*e.g.*, the *urine*, the *rectum* and *anus*, and *alvine discharges* (for *worms*, *diarrhœa*, *dysentery*, *prolapse* or *syphilis*). *Blood estimation*, the *ophthalmoscope*, *vision*, and *colour-blindness*, the *weight* to show nutrition, the *height* for stunted growth, *measurements* of the head, further investigation of the *mental capacity*, special *electrical reactions*, and the use of the *dynamometer*, *æsthesiometer*, or other of the numerous psycho-physical instruments.

Every physician must choose his own method of examination ; but the advantage of the above plan is, that the hands, once placed upon the child, need never be removed until the entire investigation is complete.

The recollection of these points as we enter the children's ward will materially assist us in our research. It is, doubtless, frequently true in the practice of medicine that we make mistakes, not because we do not know, but because we do not examine, and in the diseases of children this is eminently the case.

The medical examination of a sick child requires considerable dexterity. I do not wish to convey the idea that the examination of an adult is an easy matter. Far from it. But what I do wish to say is, that however difficult the examination of an adult may be, that of an infant is more so. Nay, more ; I might say without fear of contradiction that there is no branch of the practice of medicine in which clinical examination must be brought to such a pitch of refinement as in the diseases of children.

It forms, in my opinion, the very best, although severest, school for the clinical investigation of disease, and as a

training ground for senior students it cannot be surpassed—
a study as instructive in education as it is interesting
in research, and useful in practice.

Dr. KNOTT referred to the rheumatic nature of growing pains in
young children.

Dr. DOYLE said that very often in examining sick children it
was necessary to resort to an anæsthetic, as he experienced in a
recent case of his of hæmorrhage from the bowel.   On making a
rectal examination under chloroform he discovered a polypus, which
was subsequently removed.   One of the first things he would look
to was the condition of the mouth and pharynx and all the open-
ings of the body.   The possibility of feigned disease should always
be borne in mind.

Dr. O'CARROLL said that, as the previous speaker had hinted,
the complaints of children might in many cases be due to the sug-
gestive influence of the parent.   Children were also quite as liable
to hysteria as adults.   He did not consider reflexes of much value
in examining children under two or three years of age, as the
lateral tract was then ill-developed.   He emphasised how im-
portant it was for a young practitioner to know the times of
temporary and permanent dentition.

SIR J. W. MOORE said that it was necessary to gain the confi-
dence of the child before laying a finger on it.   He was, therefore,
inclined to criticise the recommendation about undressing the child
in an out-patient department.

Dr. SYMES, in reply, alluded to the lack of teaching in diseases
of children in Ireland.   Now that distinct sections in our asso-
ciations, separate hospitals, professors and lecturers, exist in
England, the Continent, and America, the subject should no
longer be neglected.   The frequency of disease, its high mortality,
the strangely different diseases which are peculiar to children,
and, above all, the advantage of the study as a training ground for
senior students, combine to strongly recommend it as a most pro-
fitable course for the fifth year.

A FATAL CASE OF CONGENITAL BULLOUS ERUPTION IN AN INFANT.

By RICHARD H. KENNAN, M.D.;
Assistant-Surgeon, Sir P. Dun's Hospital.

THE case I have the honour to put before you is one of congenital bullous eruption. I have preferred to give it this description inasmuch as it does not seem perfectly certain to what class of infantile bullous eruption it should be most correctly placed, and the main interest of its consideration centres round the question of its ætiology.

Before describing the case I would like to make a few remarks on the subject of bullæ occurring on the infant.

The cases seem to me to arrange themselves generally into two great classes. Pemphigus neonatorum I take as one. It is described by Radcliffe Crocker as occurring sporadically in unhealthy dwellings, and endemic in certain hospitals and in the practice of particular midwives.

The bullæ make their appearance a variable time after birth; the fluid contained in them is clear; they make little preference in their choice of locality, and patients tend to recovery.

Tilbury Fox (3rd Ed., p. 212) has, however, described severe and fatal cases.

Malcolm Morris, in his book on "Diseases of the Skin," p. 144, describes the affection in the following words:—

"The so-called pemphigus neonatorum is an affection met with in new-born infants, characterised by the eruption of bullæ on the thighs, buttocks, face, and other parts, accompanied by greater or less constitutional disturbance. The children are free from syphilitic taint, and are often well nourished."

D

"The affection is not, as a rule, of any gravity, but occasionally it assumes a malignant type, the contents of the bullæ being dark and fœtid, and gangrenous ulceration taking place with constitutional symptoms of great severity, causing death in 10 or 12 days" (Tilbury Fox).

An interesting case is recorded by Dr. Jones Greer in the *British Medical Journal*, Vol. I., 1894, p. 1241, of a child on whose chest, buttocks and neck appeared bullæ on the third or fourth day after birth. Death supervened on the eighth day, after a similar eruption had appeared on its mother's chest, buttocks, and face. The mother died seventeen days after the appearance of the rash, death being ascribed to pneumonia. There was neither history nor sign of syphilis.

Of the occurrence of pemphigus neonatorum in epidemic form, and associated with the practices of a midwife, Dr. Jükovsky, of St. Petersburg, gives an interesting record, which has been epitomised in the *British Journal of Dermatology*, 1891, p. 368. It concerns an epidemic in summer amongst infants of the poorer class. Twelve infants were affected, and they had all been delivered by the same midwife, who was of slovenly habits. The first two victims were not seen by the reporter. The blebs appeared first and most markedly on the upper part of the body, head, and face, but, even in the fatal cases, never appeared on the soles of the feet. The conjunctiva and oral mucous membrane were affected in some cases. The disease spread to brothers, sisters, and mothers.

The second class I take to be the pemphigoid eruption of hereditary syphilis. Crocker says infants are often born dead, others are born alive with it. The hands and feet are the situations on which the bullæ first and principally are found. The contents of the bullæ tend to become sanguineous, the differential diagnosis being readily made

by observing the nature, time of appearance, and position of the bullæ, and the associated cachexia, from pemphigus neonatorum.

A case is recorded by Dr. Knight in the *British Medical Journal*, Vol. I., 1893, p. 1264, of an infant who showed bullæ on both hands and feet, of deep coppery-red colour, associated with erythema on the face without bullæ. The mother had mucous tubercles at the time. The infant was her second; the first had been still-born and decomposed.

Since writing the bulk of this paper Dr. Walter Smith has very kindly called my attention to the article by Dr. Wallace Beatty in the *British Journal of Dermatology*, Vol. IX., p. 301, August, 1897, on "Epidermolysis Bullosa," which I have referred to, but I do not think the present case can be included under that head. I think it will be agreed that this case does not readily fall into either of the two great classes I have described, though to one of them it, in all probability, belongs.

Case.—The infant, W. C., came under my care when I was on duty for Dr. Ball in Sir P. Dun's Hospital, on 18th August, 1899. The infant was brought by his aunt, who stated that it was born on the night of the 15th inst. It was a full-term male infant, below the average size, fairly well nourished, and provided with a considerable growth of hair. Its skin had the reddish-brown, jaundice-like colour of the new-born. The sclerotics were white, but in the left eye a small sub-conjunctival hæmorrhage was seen. The stump of the umbilical cord was normal; the anterior fontanelle was depressed.

The sole and dorsum of the *left foot*, with the exception of the heel and dorsum of the third and fourth toes, were ulcerated, and of a deep purple-red colour; shreds of epidermis were adherent to the margins. The discharge was slight, non-hæmorrhagic, with slight, if any, purulent characters; the edges were sloping and slightly sinuous. The surrounding skin was normal, and there was neither œdema nor inflammatory reaction in the neighbourhood of the patches. The area extended up over and around the ankle, and up the shin for a short distance. On the dorsum of the

right great toe a partially collapsed bulla was present. There was a bulla full of clear, yellow fluid on the back of the *left elbow*, and on the dorsum of the fingers of the *right hand* there were collapsed bullæ. The child's tongue, lips, and gums were raw-red, with shreds of epithelium, partially detached, hanging from them. The skin of the buttocks was inflamed and excoriated. There was no evidence of snuffles or condylomata.

19th August.—Bullæ had appeared on the dorsum of the fingers of the *left hand* and on the *right elbow*. A bulla was found on the œdematous scrotum, and another above the right heel.

20th August.—The patient was admitted to hospital. No fresh bullæ had appeared. The infant was fretful, though it slept and took nourishment fairly well. It temperature was 102·6° F. in the axilla. The cardiac and respiratory sounds were normal. Neither the spleen nor the liver was palpably enlarged, and lymphatic glands could not be felt anywhere. The contents of one of the bullæ were removed by Dr. O'Sullivan, who very kindly undertook the examination for me.

21st August.—The bulla on the left elbow burst, but when the epidermic shreds were removed fine hair could be distinctly seen covering the inflamed area. The anterior fontanelle was much depressed, and the cranial bones tended to override one another. The child's cry was hoarse. The pupils were equal. Movement of arms and legs was normal, as apparently was also tactile sensibility.

22nd August.—Spasmodic contractions occurred occasionally in its arms when disturbed to be fed. The bowels have moved frequently.

23rd August.—Child died without definite convulsions having appeared. Treatment consisted in hydargyri cum créta, gr. i., *ter in die*, for three days ; and then gr. ss., *ter in die*, wine whey, and humanised milk.

I am indebted to Mr. George White for the trouble and care he so kindly took in photographing the child after death, and the skill with which he has prepared enlargements. An attempt was made to obtain pictorial records of the cutaneous lesions before death, but owing to the restlessness of the patient it proved unsuccessful.

It may be of interest to note that before the withdrawal of the contents of the bulla it appeared to be of a slightly reddish colour ; in the syringe, however, the fluid was seen to be a clear, pale straw-yellow colour. It seems reasonable to suppose that the same coloured fluid may present different appearances, not only accord-

ing to the covering through which it is seen, but also according to
the character of the surface on which it rests.

Dr. O'Sullivan found the fluid which he removed to be sterile.
I have to express my thanks to Dr. O'Sullivan and Dr. Littledale
for the assistance they so very kindly gave me in the pathological
investigation of the case.

The child's father (a carman) was interviewed. He said his
age was twenty-nine years. He had been healthy all his life,
except that he had small-pox when a lad. He denied ever having
had a rash of any kind (except variolar), sore throat, or sores. He
was examined for signs of syphilis, but none could be discovered.
He stated the sanitary arrangements of the house were quite
satisfactory. He appeared to belong to a somewhat better class
than those who usually seek relief from hospital.

26th August.—The child's mother was interviewed. She was
twenty-seven years of age. She was married five years ago, when
twenty-two years old. She had never suffered from any complaint
except toothache. She appeared to be anæmic, but otherwise
healthy. She said she felt better after the birth of her last child
than she had done at the same time after the birth of her other
children. Her breasts were fairly full, and she suffered a good deal
from tingling pain in them, which had been relieved by the applica-
tion of belladonna plaster and the administration of potassium
iodide. The nipples were large, and pigmentary areolæ were well
marked. No milk could be squeezed from them. No evidence
whatsoever of syphilis could be found.

The history of her pregnancies was as follows :—

First pregnancy was a male, full term, 12 months after marriage ;
born in the Rotunda ; lived only 24 hours ; died of convulsions.
The labour was normal.

Second pregnancy—Female. Labour normal; healthy; now
three years of age. She is somewhat delicate, but suffers from no
definite trouble, and has never had snuffles, rash, sore throat, or
condylomata. No sign of hereditary syphilis could be found on
examining her.

Third pregnancy—Male, 1 year and 7 months after the birth of
the second ; was full term ; died, at three months of age, from
diarrhœa and vomiting, after a few days' illness. It had never
had snuffles, rash, or sores. Labour had been normal.

Fourth pregnancy—Male (the subject of this paper). When
three months pregnant the mother was frightened by the horse in

the yard, and in consequence fell; but this was not followed by signs of threatened abortion. She felt no "life" till over a month afterwards.

The midwife (Mrs. D.) said she arrived after the membranes had ruptured. The presentation was vertex; the labour normal; the cord and placenta appeared to be normal. There was no blister on the child at birth, but the left foot was ulcerated, in consequence of which the child was not bathed. A blister was noticed on the left elbow next morning, and its mouth was sore. She had never before seen a similar case, or known of such an one in the district. The mother's temperature remained normal all through her puerperium. The midwife appeared to be very intelligent, and showed more than average knowledge of her work. I regret, however, that she was unable to give any information as regards the child's temperature at birth.

August

		20	21	22	23									
		M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E
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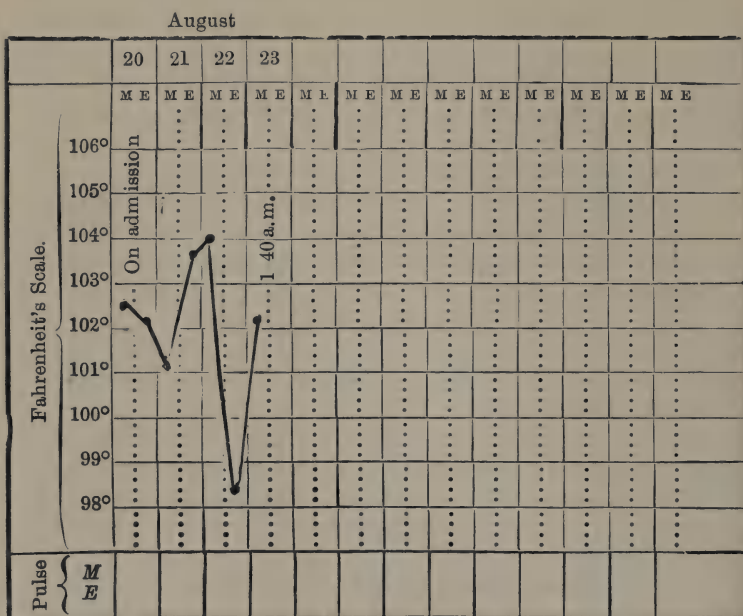
The *post-mortem* examination was performed by Dr. O'Sullivan, Pathologist to the Hospital. The body weighed 6 lbs., the liver 6 ounces. The cranial bones, the meninges, and brain showed no

evidence of disease. The anterior part of the tongue was denuded of its epithelium ; the larynx was inflamed ; the vocal cords were involved in an inflammatory exudation, by which their identity was somewhat obscured. The lungs were congested, and no evidence of pneumonia was found. The pleuræ were healthy, and their sacs contained no excess of fluid ; the heart and pericardium were free from abnormality. The stomach, intestines, and lymphatic glands showed no indication of disease. The liver presented no gross pathological appearance apart from general congestion. The spleen was small, the testicles healthy. The suprarenal glands were not manifestly diseased ; the kidneys and pancreas also. A piece of the skin at the dual verge, which was inflamed and ulcerated, was removed, as well as a piece from the floor and margin of the ulcerated area on the sole of one foot, for microscopical examination. The lower end of the left femur was also removed for the same purpose. Portions of the lungs, spleen, kidneys, liver, pancreas, testicles, skin, and lower end of femur were microscopically examined. No pathological change, except great vascular congestion, could be discovered. The practical result of the *post-mortem* investigation consisted in the demonstration of the entire lack of definite evidence of hereditary syphilis having affected the infant.

Jonathan Hutchinson, in his work on syphilis, on page 418, says—" Whether there be any infantile condition not connected with syphilis in which bullæ occur on both hands and feet, *and are of dangerous import*, I am not competent to say. Should any such come under observation they would well merit careful investigation and record." I have been largely influenced by this statement in considering whether the record of this case would merit report, and it will, I trust, serve as my justification for bringing it forward. Again, on page 79, he says—" It is a most noteworthy fact that if syphilis affect the fœtus it almost invariably causes its death, for nothing is less common than for an infant to be born alive with extant signs of taint. Three weeks or a month almost invariably intervene before the eruption, snuffles, &c.,

appear. A very perplexing exception to this occurs in the case of what is known as infantile pemphigus. In this disease the eruption may appear in an apparently healthy child within a day or two of birth, and the case may end in death within a week. These cases need further investigation, and it is hopeless, in our present state of knowledge, to attempt to explain them.

" As to the existence of signs of syphilis in living infants born at full term, we must receive the published testimony of the older surgeons with caution. Not having the importance of this special point in mind, they often assumed on seeing a syphilitic infant that it had been born with the symptoms. Obstetricians would probably give evidence of a different kind. Thus, whilst Diday, who had enjoyed very extensive opportunities of special observation, had never once seen signs of syphilis present at birth, we find Sir Astley Cooper stating that he had seen several children born with ' copper ' coloured eruptions on the palms, soles, and buttocks. Probably all that he meant is that the infants were young when first seen by him. I have never myself seen an infant born with a syphilitic eruption or one in whom the evidence was clear that such an eruption was present at birth. In spite, however, of some scepticism, the facts must be accepted that such infants are occasionally seen.

" Rondelet, Doublet, Gilbert, Guerard, and Laudman are all quoted by Diday as having published single cases in which infants were born with characteristic eruptions."

In the " Treatise on Syphilis in New-born Children and Infants at the Breast," by P. Diday, translated by G. Whitley for the New Sydenham Society, on page 70, he says :—" Some children present at birth or a few days after it an eruption of bullæ, the principal seats of which are the soles of the feet and palms of the hands." He

admits, however, the possibility that eruption may be present on the trunk. The contents are referred to as blood mixed with pus.

" Such a group of phenomena being present the inference of a syphilitic origin will be the more confident in proportion as the admissions of the parents and the co-existence of other evident signs of syphilis give it support." Wichman is referred to as the propounder of this theory at the end of last century, and Jörg, Dugès, Stoltz, and Cazenave as favouring it ; while Osiander (in 1794) and Krauss and Gilibert are against it.

The striking discussion at the Academy of Medicine in Paris, in 1851, between the chief representatives of the two opinions is detailed—how Paul Dubois argued for its syphilitic origin, while Cazeaux pleaded its innocence of that taint.

On page 74 it is stated that, " Certainly if all pemphigoid children proceeded from parents infected with syphilis, and all also presented, simultaneously with the bullæ, evident traces of constitutional syphilis, we might shut our eyes to the want of characteristic marks, and regard these coincidences as proofs. But this is not so. Under such circumstances we often address—and regret to have done so without any result—a biassed inquiry to the father and mother. Most frequently pemphigus is the sole appreciable lesion in the child."

It must be remembered that at this time the discussion was whether all cases of infantile pemphigus were of syphilitic origin, and not as to which were and which were not of such origin.

He adds—" Let us confess, however, that the number of cases of infantile pemphigus in which the existence of venereal disease in the parents has been ascertained has been sufficient to make an impression upon unprejudiced

minds; and although most of the members of the Academy still entertain doubts as to the nature of this eruption, the mixed opinion—that of conciliation—which makes it not an immediate result of syphilis, but an indirect sequela of the exhaustion which that disease produces, has obtained many suffrages. I adopt this solution, but would fain explain and define it."

He is then careful to point out that though syphilis is, when present in the parents, a source of enervation, there are many other enervating elements which may be present in parents. Notwithstanding this, he says syphilis in the parent will much more frequently account for it than any other cause.

Lancereaux, in his "Treatise on Syphilis," Vol. II., p. 142, translated for the New Sydenham Society, 1869, says:—"While in the adult it (pemphigus) is almost always independent of syphilis, in the child, on the contrary, it most frequently co-exists with changes, the syphilitic origin of which is indisputable, and on that account it has long been held that a causal relation existed between the pemphigus of new-born children and the venereal disease."

.   .   .   .   "In 1837 Depaul introduced into a new phase the question at issue by the connection which he established between the pemphigus of new-born children and certain co-existing pulmonary lesions."

After referring to the discussion in Paris in 1851, he says (p. 143):—"Since that time Desruelles, Fèvre, Bamberger, Olivier and Ranvier, and H. Roger, have brought fresh cases in support of the doctrine that pemphigus of the extremities is a manifestation of hereditary syphilis." Then follows a list of many who accept and advocate this view. He then says:—"Men of great merit, however, still hesitate to pronounce themselves on this point, or

do not partake of the view which appears to us to be the most correct one."

Tilbury Fox, in his work on "Skin Diseases," to which reference has already been made, says :—" Pemphigus is almost always chronic, but there is an acute form, and, therefore, in accordance with most authors, I make two groups—acute and chronic. Acute pemphigus is seen in children, and is practically synonymous with pemphigus neonatorum. Now the greatest doubt exists as to the nature of this affection. According to Dr. Steffen there are three forms—(1) pemphigus occurring in children apparently healthy, and ending favourably ; (2) pemphigus in children who have been badly nourished, or who have fallen into a state of marasmus, and in whom it is, therefore, the result of cachexia ; and (3) syphilitic pemphigus. . . . . It seems clear to me that there is a non-syphilitic and a syphilitic form." He says further, concerning syphilitic pemphigus neonatorum acutus :—" It occurs not as an epidemic, but in connection with other symptoms of congenital syphilis, and is well marked about the hands and feet soon after birth ; it may give rise to deep ulceration."

Haight is quoted as having "shown that the fluid in pemphigus is collected between the layers of the horny portion of the epidermis."

The fluid in the bulla on the left elbow in the case I have read was most probably in this situation, inasmuch as fine hair could be distinctly seen covering the area which had been occupied by it after its contents had been expelled and the thin shreds which remained of the covering had been removed.

If, then, it be admitted that there is a syphilitic and a non-syphilitic bullous eruption which attacks the infant, is one justified—no assistance being obtainable by the

examination of the parents or other members of the family—
in making the diagnosis of syphilis when the bullæ are
confined to the hands, feet, and buttocks ? or, on the other
hand, should they be found trespassing on other parts, and
avoiding the hands and feet, must the case be relegated to
the non-syphilitic class ?

I may, perhaps, be allowed, in conclusion, to briefly
reiterate the points of the case which have seemed to me
to render it of sufficient difficulty to justify me in asking
the kind assistance of the members of this Academy in
trying to form a clearer conception of the true nature of
the forces at work which produced the appearances and
result.

If it be not regarded as a case of syphilitic congenital
bullous eruption, it must, as it seems to me in the present
state of our knowledge, be included in the only other well-
defined class—that which most commonly receives the
name " pemphigus neonatorum." The fatal termination,
though not absolutely negativing such a diagnosis, at any
rate removes it from association with the majority of such
cases. Again, the remarkable localisation of the sites of
the earliest and severest cutaneous lesions—viz., the hands
and feet—still further assist in making its correct inclusion
amongst that class very problematic. On the other hand,
if it be received amongst those cases owning a syphilitic
cause, we are opposed by the facts that—Firstly, no
evidence could be gained from the parents, either by
interrogation or examination, which could in any degree
point to the existence of syphilis in them. Secondly,
that though it is true but one of the three previous
pregnancies was successful in producing a child which
has passed safely through the period of infancy, there is
nothing in this fact alone to give any assistance of a
positive kind ; further, the second, or surviving, child has

neither history nor sign of congenital taint.   Thirdly, *post-mortem* examination has failed to establish confirmatory evidence in favour of a syphilitic origin.

I am aware that one of these considerations taken alone would give but slender ground for the justification of an opinion, but taken together they must, I think, be allowed considerable weight.

Dr. Langford Symes said this case resembled one he saw some years ago, but the bullæ were not so prominent, and it was more a case of violent purpura than this case.   It was in a two or three weeks' old child, which died within four or five hours of its admission to hospital.   It had been described by German writers as purpura fulminans, and the blood-stained fluid described by Dr. Kennan seemed to point in this direction, but the case he had seen had not so many bullæ, and had far more purpuric marks.

Dr. Walter Smith said that bullæ were produced on the skin under such diverse conditions that it was doubtful how far they were to accept a particular generic word such as pemphigus.   He objected to placing a skin affection due to a distinct ætiological factor, say syphilis, under the same name as one not due to a distinct cause.   He, therefore, objected to a diagnosis such as syphilitic pemphigus or psoriasis, because it was not possible that psoriasis could be both syphilitic and non-syphilitic.   They could say a scaly syphilide.   He agreed with Dr. Kennan in the non-syphilitic character of his case.   They often saw pemphigus in connection with acute dermatitis, such as erysipelas, and even in ordinary scabies he had seen very large bullæ occur, as well as in cases of neuritis, such as herpes zoster and traumatic affections of nerves.   In the class due to unknown causes he would rank cases he would like to apply the term pemphigus to.   He would be inclined to define pemphigus as " an eruption of abruptly defined, fragile, thin-walled bullæ, upon a non-inflamed surface, symmetrical, and prone to relapse."   They might be content to leave Dr. Kennan's case in the class of those due to an unknown cause, though the big word tropho-neurosis might please some.   Even in cases of ordinary pemphigus of a relapsing sort, repeated bacteriological examination had revealed nothing definite.

Dr. Kennan briefly replied.

NOTES ON A CASE SIMULATING A PERFOR-
ATING GASTRIC ULCER.

By WILLIAM JOHN THOMPSON, M.D. Univ. Dubl.,
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AND

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[Read in the Section of Medicine, March 9, 1900.]

For the past few years so many successful cases of opera-
tion for perforating gastric ulcer have been recorded that
it is now universally admitted both by physicians and
surgeons that all cases (except those in which there are
some distinct, unfavourable symptoms) should be operated
on as soon as possible after the perforation has taken
place. It has, however, been pointed out by many
writers—Van Valzah, Nesbit, and others—that occa-
sionally there are some difficulties to be encountered in
arriving at a correct diagnosis, and consequently there
may be some uncertainty and possibly delay in operating,
which may mean life or death to the patient. Looking
over a number of cases reported from time to time, I
frequently find some of the symptoms which are usually
looked upon as pathognomonic absent, and in any one
case it is almost the exception, rather than the rule, to
find all the classical symptoms present. The case which
my colleague, Mr. Conway Dwyer, and myself are bring-
ing forward before the Medical Section of the Royal
Academy is, in our opinion, a good example of the
difficulties met with in forming an accurate diagnosis.

Although all the usual symptoms were not present, we think we were justified in looking upon the case as one of perforation and in advising operation.   The operation proved our diagnosis to be at fault ; but still we have the gratification of believing that it saved the patient's life. We therefore thought that, perhaps, short notes on the case might be of some interest to the Fellows and Members, and might possibly lead to some useful and profitable discussion.

The following is the history and subsequent treatment of the case :—

Early on the morning of December 22nd, 1898, I was asked by a patient of mine to see his housemaid, whom, he stated, had taken seriously ill during the night.   From the girl herself, aged twenty-three years, who looked very thin and anæmic, and who seemed to be suffering great pain, I got the following history :—Both her father and mother died when she was quite a child, and she believed they died from phthisis.   Her two brothers and one sister had, in adult life, succumbed to the same disease.   She had only one sister living, who was strong and healthy, and who was three years her senior.   She herself had never been robust, although up to that date she had not suffered from any protracted or acute illness.   For the previous five or six weeks she had been affected with stomach trouble, which had gradually become so severe that for some days she had found it impossible to take the ordinary food, and was obliged to keep on slops.   In the beginning of the attack she had discomfort and flatulency after food, with a tendency to nausea and a failing appetite.   Later on, in addition, she had pain, at first localised to the pit of stomach and afterwards extending to the back, which usually commenced shortly after taking food, lasted a couple of hours, and was frequently followed by vomiting.   She had not at any time, either before this attack or during the attack, suffered from constipation.   On the night of the 21st she partook of bread and milk for supper, which was followed by the usual pain both in the epigastrium and dorsal region, with a nauseating feeling.   About one hour after the meal, and when in bed, the pain in the epigastrium

became suddenly severe and agonising, and was followed by vomiting. The vomited matter was, she stated, dark and reddish in colour, otherwise there was no indication of hæmorrhage. The pain got worse during the night, and became more diffuse. When I saw her there was distension of the epigastrium and upper portion of the abdomen extending towards the left side, which was rigid and intensely tender on pressure. The liver dulness was not affected. She localised the original painful epigastric spot a little to right of median line, and a short distance below ensiform cartilage, and the pain in her back to the left of the lower dorsal vertebræ. Her temperature was 100·8°, pulse 124, and respirations, which were superficial and thoracic, 26 per minute.

As the previous history, symptoms, and physical signs pointed pretty strongly to a case of gastric ulcer which had perforated, and as there were no facilities for operating where the patient was, I suggested she should come into Jervis-street Hospital, which she did. On her admission—apparently not much the worse of being removed—my colleagues, after seeing and examining the case, concurred in this opinion, and thought her a suitable subject for operation. Accordingly, with as little delay as possible, Mr. Conway Dwyer, assisted by Mr. Cranny, operated about fourteen hours after what was considered the perforation. Immediately before the operation the pain, distension, rigidity, and intense tenderness had increased, the liver dulness had not been apparently affected, the temperature had risen to 102°, the pulse to 140, and the respirations to 34 per minute.

OPERATION.

With the assistance of my colleague, Mr. Cranny, I proceeded to at once operate on the patient, whose condition was as described above by Dr. Thompson. The abdomen was opened in the middle line by an incision extending from the ensiform cartilage to a point slightly to the left of the umbilicus. Owing to the extreme rigidity of the left rectus, which persisted even under deep ether narcosis, it was found necessary to enlarge the opening transversely before sufficiently free access could be obtained for efficient exploration. The anterior surface of the stomach was then examined, and nothing abnormal was found. No gas, fluid contents, or lymph was anywhere present—in fact, nothing to suggest the presence of any per-

foration. This appeared difficult to understand, taking into account the symptoms. I felt convinced that some serious condition must be present, and determined before examining the posterior wall of the stomach to further explore the abdomen. I enlarged the wound downwards, and immediately discovered a coil of the jejunum in an intensely inflamed condition, covered with thick flakes of lymph, and having on its surface two almost gangrenous patches. No perforation had as yet taken place, but such a result was inevitable had there been any further delay. I drew the damaged coil outside the abdomen and isolated it by strips of iodoform gauze from the peritoneal cavity. I next very gently pressed the contents downward, and applied clamps, including between them nine inches of the bowel. This I resected, and effected the intestinal junction by means of a Murphy's button, reinforced by a few peripherally placed Lembert sutures. The abdomen was flushed with warm saline solution, the intestine returned, and the wound closed, all but the lower angle, through which I passed a gauze drain in the immediate neighbourhood of the sutured bowel. The question of drainage is an open one, but I confess that the possibility of leakage and its disastrous results more than counterbalance the advantages of rapid and complete union. The patient bore the operation well. The subsequent course of the case was uneventful. The temperature fell immediately after the operation, and never rose above normal, the bowels moved naturally on the fifth day, and the button came away on the eighteenth day. Dr. Joynt very kindly, at my request, skiagraphed the patient, but with a negative result. This, I think, was due to the fact that the button had dropped into the pelvis, and of course no shadow could be obtained.

This case illustrates impressively the fallibility of diagnosis, or perhaps it suggests that the interpretation of symptoms is occasionally too rigidly made. Here everything pointed to the existence of gastric perforation : the previous history, the urgent symptoms, and the great collapse—in fact, almost all the classical symptoms in their due sequence and severity were present ; the only absent sign was the unaltered area of liver dulness ; this has, however, been frequently noted.

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Mr. Myles, in a recent communication of great interest read before the Surgical Section of the Academy, brought forward a series of examples showing the liability to error that exists in cases of this description, and frankly details his own experience.   There can be no doubt that a similar candour on the part of other surgeons would swell the list to quite respectable dimensions.

The practical lesson to be learned from such cases as the one recorded is not to lose valuable time in academically balancing probabilities, but to proceed at once to operation.   If the case is one in which surgical aid is unavailing or unnecessary no harm will be done by a surgeon versed in the technique of abdominal work, while prompt interference has saved many lives.

I believe the lesion present was the result of infarction from mesenteric thrombosis.   The specimen was unfortunately mislaid before a microscopic examination was made.

Dr. R. Travers Smith asked if any cause had been found why the coil of the jejunum should have become gangrenous.

Dr. Craig said that so long as liver dulness was present he would hesitate in giving a diagnosis of perforation into the abdominal cavity, though rupture might take place into an abscess on the posterior wall of the stomach without the occurrence of this sign.

Dr. Doyle said that it had not been proved that there was no gastric ulcer in this case, though there was certainly no perforation.

Dr. Kirkpatrick related a recent case diagnosticated as perforated gastric ulcer which had taken place ten hours before being sent to hospital.   Although the liver dulness was apparently normal before operation, which was done two hours after admission, a small perforated ulcer was found on the anterior wall, and the contents of the stomach were found in the abdominal cavity.

Mr. Croly spoke.

Dr. Littledale asked if the condition was due to an infarction of the intestine.   If there was no adhesion found that might be a

possible explanation of the condition. He considered that the mesenteric vessels were not sufficiently examined in such cases.

Dr. Peacocke saw a case under Mr. Gordon's care with acute symptoms like strangulation. They could feel the coil of intestine through the abdominal wall. After laparotomy an almost gangrenous coil of intestine was found, but no bands or adhesions, and the conclusion come to was that a thrombus had formed owing to syphilitic affection of the arteries.

Dr. Parsons said that some eight or ten years ago he had brought before this Section some cases of perforated gastric ulcer coming under his observation while Resident Medical Physician in Sir Patrick Dun's Hospital. He related again some of the particulars of these cases, and observed that he had then emphasised the necessity of early laparotomy in such cases. Personally he knew no point to which he attached more importance in diagnosis than the abolition of the area of hepatic dulness. One other point of importance was a steady increase in the rapidity of the pulse. The temperature was of no value, as in the worst cases they found subnormal temperature, and in most cases he had seen there was no febrile reaction.

Dr. J. W. Moore said he remembered a case in the Meath Hospital in which a perforated gastric ulcer produced all the symptoms of empyema, and tapping confirmed this diagnosis. There was also a discharge of pus from the bronchial tubes. The autopsy showed that the abscess was below the diaphragm, which it had perforated.

Dr. Thompson, in reply, said that in the most recent work on the subject the absence of liver dulness was stated not to be an absolute sign, neither was the absence of hæmatemesis.

Mr. Dwyer said that an examination had not been made, as the specimen had been mislaid, but he had no doubt that it was due to a thrombus, owing to the sharply defined nature of the gangrenous patches and the absence of adhesions. Mr. Treves had described many cases of that kind.

THE SYMPTOMS OR PHENOMENA FORMERLY KNOWN AS CROUP; THE DISEASES WHICH PRODUCE THEM; AND THE CLINICAL SIGNIFICANCE OF THE VARIOUS ALLIED AFFECTIONS EMBRACED BY THE TERM.

By LANGFORD SYMES, F.R.C.P. (IREL.), &c. ;

Physician to the Orthopædic Hospital of Ireland ;
Physician to the Convalescent Home, Stillorgan, &c., &c.

[Read in the Section of Medicine, April 6, 1900.]

As a short sequel to the discussion on Mr. Croly's paper of January 26, 1900, I have thought it well to try to sum up if possible the points in which we are in accord.

When sent for to a case of "Croup" we have no idea what lies before us. We picture a child choking from a disease perhaps beyond our control, or possibly it may be but a passing spasm. Between these two extremes an infinite variety exists. They are all called "croup," but the word practically only conveys that respiration is impeded in the larynx. "We should be far better without the word. There is no such disease as croup; the word merely expresses a single symptom,"[a] just as the terms dropsy, coma, or convulsions. It is well, however, for us to clearly know what it means, what is the clinical condition, and to mark some limitation for the term.

The following group of symptoms seem to me to be embraced by the term. I give you them, as I gathered them, fresh from the original at the bedside.

[a] Edmund Owen, Surgeon to the Hospital for Sick Children, Great Ormond-street.

CROUPY SYMPTOMS.

1st. *Laryngeal Stridor.*—A dry,· croupy, tracheal wheeze heard at the bedside; while sleeping a stridulous wheeze persists. This merely indicates difficulty of breathing from some impediment or narrowing, preventing the air passing freely. The lungs are clear; the throat is clear to view, or perhaps slightly, if anything, reddened, certainly not swollen.

2nd. *Cough with a barking "croupy" sound.*—The fit consisting of inspiratory dyspnœa with a couple of croupy barks suddenly following. Sometimes in the middle of a fit of coughing the child gives a loud whoop as in whooping-cough, chiefly heard in convalescence.

3rd. *Night Attacks.*—Worse at night. About eleven o'clock the child begins to get bad attacks, often two or three during the night. It starts up in terror, gasping, wheezing, crouping, and barking very terrifying to witness; hardly any air entering, and in peril of choking. Apparently due to spasms.

4th. *Great Restlessness* and tossing about; also from impediment to respiration. This is in my experience a grave sign, and in fatal cases, where the child does choke, most agonising to witness. It is also the first sign by which to estimate improvement.

5th. *Recession of the Chest.*

Through all these the voice may be quite clear, even when stridor is alarming. These are the five symptoms for which we are summoned, and they are popularly called "croup." But to what are they due? They are merely manifestations of actual disease which underlies them. The stridor is caused by narrowing, the cough by irritation or foreign material, the night attacks by spasm, the restlessness by asphyxia, and the recession of the chest by atmospheric pressure from obstruction to the entrance of air. Clearly, then, the acute

diseases which produce these morbid changes and croupy
symptoms are all embraced by the term.

Their diagnosis is always difficult, sometimes impossible.
Roughly speaking, and from a clinical standpoint, they seem
to possess two main characteristics: in one group specific or
inflammatory disease exists in the larynx (*e.g.*, diphtheria and
laryngitis), while in the other the obstruction is mainly due to
spasm. They are as difficult to separate on paper as they are
at the bedside, for the spasmodic cases are sometimes fatal,
while the laryngitis group are seldom devoid of spasm. We
may have every variety, from raging diphtheria on the one
hand, to a trivial laryngismus on the other; and as this latter
disease is often confounded with the rest it must be men-
tioned, though really an entirely different condition.

I propose to briefly treat of three main species :—

    I. Diphtheria,

    II. Laryngitis, and

    III. Laryngismus.

I.—*Diphtheria (Diphtheritic Laryngitis—Laryngeal Diph-
    theria—Membranous Laryngitis—Diphtheritic Croup—
    Membranous Croup—True Croup—Secondary Croup
    of Dr. Stokes—Cynanche Membranacea—Cynanche
    Maligna).*

There can be no doubt but that true croup, diphtheria,
and membranous laryngitis are forms of the same disease,
produced by the reception and cultivation in the body of
poisonous germs. Croup is the disease when diagnosticated by
the ear, diphtheria when diagnosticated by the eye, and deaths
registered as croup are, I believe, mainly due to diphtheria;
but croupy symptoms are not necessarily always due to this
disease. In 1879 the Scientific Committee of the Royal
Medico-Chirurgical Society affirmed the diphtherial identity
of membranous croup. Some[a] dissent from this, and state

        [a] *E.g.*, Mr. Lennox Browne, F.R.C.S.

that 14 or 15 per cent. of membranous croup are non-diphtherial, on the ground that some cases reveal diplococci and others similarly affected in the same house are also coccal. Therefore, he argues, some membranous croups cannot be strictly diphtherial or notifiable. Doubtless it is held that membranous exudation in the windpipe may be produced by mechanical and chemical irritants, and there is some evidence that membranous laryngitis has followed exposure to cold. But I hold that there is also evidence that there are several varieties of the disease we now call diphtheria; some of a fœtid purulent nature, and the absence of Klebs-Löffler bacillus must not be regarded as proof that an angina is not diphtheritic. Experiments in the laboratory may give results which clinical observation entirely fails to endorse. In the present state of our knowledge it is not wise to take up a dogmatic position except to view every case of laryngitis with the greatest suspicion, as it may turn out to be diphtheria. But I agree with Mr. Edmund Owen that the more I see of sore throats with laryngeal obstruction the more firmly do I believe that they are all diphtheritic. Again, I feel in accord with the conclusion of Sydney Martin, Sims Woodhead, and Sir Richard Thorne Thorne (1892) that "there is no evidence at present that there is any disease other than diphtheria which can produce a false membrane in the larynx." Recollect that diphtheria may be entirely confined to the larynx, to the trachea, or even the bronchial tubes without being visible.

When confronted with a case presenting the urgent croupy symptoms I have described, the points which may stamp it as diphtheria are the following :—

1. *Gradual Onset.*—The croup is preceded by fever. The child is sneezing or sickish for perhaps three whole days with an unaccountable feverish attack. It commences quietly and grows steadily worse. There is a slowly rising

acute febrile period before the larynx is affected, develop-
ing croupy stridor about the fourth day. It is a microbic
or miasmatic poison saturating the system and showing
itself in the larynx, rising gradually to a perilous and
alarming crisis about the fourth or fifth night when the
child is in danger of choking.

2. The *Cervical glands* may be enlarged, hard, and painful.

3. *Enlarged area of cardiac dulness.*—I have found the heart
   somewhat dilated, being dull to the third rib, one finger's
   breadth outside the left nipple and mid-sternum.   This
   dilatation of the heart is not constant in the commence-
   ment, and may then be found at one hour and not at
   another hour during the same day.   I have found it well
   established by the ninth day.

4. It may be traced to *vegetable decomposition,* to foul drains,
   sewers, or manure heaps, which cause an initial sore
   throat, or perhaps direct infection.   I have traced some
   cases to vegetable decomposition.

5. *Albumen* in the urine and severe illness of the child point
   very decidedly to diphtheria.

6. The possible discovery of *membrane* in the pharynx and
   bacteriological confirmation at once settle the question.

7. The protracted illness and slow recovery indicate diph-
   theria, as also a fatal ending.

8. Communication to or from others can only be diphtherial.
   There is sometimes a *septicæmic rash* in diphtheria on the
chest and abdomen, and the *knee-jerks* are occasionally absent,
while the continuance of a low temperature with grave illness
and croupy symptoms point to its diphtheritic nature.

II.—*Laryngitis.*—Two forms of laryngitis especially concern
   us:—(1) Acute laryngitis, and (2) Laryngitis stridulosa.

1. *Acute Laryngitis (Catarrhal Laryngitis—Acute Non-mem-
   branous Laryngitis—Simple Laryngitis).*

The swelling and œdema which block the way in acute

laryngitis may sometimes produce croupy symptoms, and may present every variety from hoarseness and stridulous breathing to fatal œdema of the glottis.

The distinguishing features here are :—Hoarseness of voice, the respiration has a more hissing sound, no enlarged glands, more rapid onset, no albuminuria, no special night attacks. It chiefly follows colds or chills, or succeeds to measles or whooping-cough. No alteration of the knee-jerks. No dilatation of the heart. No infection. It is hard to make a certain diagnosis, for these peculiarities may happen with diphtheria, and hence it is wise to suspect diphtheria in every case of croup.

2. *Laryngitis Stridulosa* (*Catarrhal Spasm—False Croup— Pseudo-Croup—Spasmodic Croup—Spasmodic Laryngitis—Primary Croup* of Dr. Stokes).

This is the disease which most closely simulates diphtheria. It is a spasmodic narrowing of the windpipe—a catarrhal spasm, having much spasm with a little catarrh. It occurs in children over three years of age, and when we are told that "my child is very subject to croup," this is the disease in question. It produces all the above "croupy symptoms," and may be of great urgency. Dr. Stokes describes fatal cases, where at the *post-mortem* examination the larynx was not obstructed, showing death was due to spasm. It is distinguished from diphtheria by the following special features:—

1. *Very Sudden Onset.*—The child goes to bed quite well, and suddenly wakes up in the night with alarming laryngeal obstruction, great distress and dyspnœa ; death seems imminent, and advice is hastily summoned. The suddenness of the stridulous breathing is remarkable.

2. *Occurs at Night.*—It is very bad for some hours, and then subsides.

3. *Recurrent.*—We are often told "my child is very subject to croup," or the mother or nurse will state that the child has very often had it before.

4. *A Family Affection.*—Some of the other children of the
     family often suffer from it.
5. *Quick Recovery* is the rule, and it is rarely fatal.
6. It often occurs in children with *enlarged tonsils,* or
     adenoids.

   In one of my cases five children of the same family had it
frequently for some years, and they were all affected with
adenoids.

7. It occurs in children over three years of age (*cf.* laryn-
     gismus), and ceases when the child is 14 or 15 years old.
8. Vomiting often gives relief.

   With chronic laryngitis (syphilitic or tubercular), foreign
bodies, warty growths, or stricture of the trachea, we have
nothing to do at present.

III.—Lastly, *Laryngismus* (*Child Crowing—Spasm of the
     Larynx—Laryngeal Asthma—Spasm of the Glottis—
     Laryngismus Stridulus*).

   This is an entirely different condition, and should not be
included in the term, for it does not produce croupy sym-
ptoms. A convulsive disorder of young infants, unattended
by cough. A pure neurosis, or spasm, occurring almost
exclusively in rickety infants about 18 months old, with
large fontanelles and delayed dentition, and often accom-
panied by tetany contractions of the thumbs and toes. A
spasmodic affection of the larynx, causing sudden arrest of
breathing, or "holding of the breath" for a few seconds in
the position of expiration, followed by a " crowing" inspira-
tion when the glottis opens and air rushes in with a stridor.
It is very rare before six months or after three years. There
is no fever. It occurs suddenly while the child is running
about, or in the night, with no warning. There is no hoarse-
ness, and the child is perfectly well in the intervals. The fit
is started by some emotion, annoyance, fright, crying, or
perhaps the irritation of adenoids or teething. It varies
from a slight crowing sound to extremely dangerous fits of

dyspnœa and cyanosis, with the hands clenched, the limbs stiff, the veins turgid, and the face blue, or even convulsions. It is mostly recovered from, but there is danger of the spasm being fatal. The epiglottis is shut down over the larynx. The attacks are frequent, sometimes 4, 6, 8, 10, or even 20 in a day. Many cases have the "crow," but the worst cases are the silent ones, from the complete strangulation.

Three varieties of the spasm are known :—

1. *Rachitic*, occurring as described above in rickets, similarly to facial irritability, tetany, or fits. This is also called " direct " spasm, signifying its direct connection with the brain, the irritation coming directly from it. A pure spasm of the muscles. No fever, coryza, or laryngeal catarrh. No cough. It is occasionally fatal, and is sometimes a cause of death under chloroform during operations for adenoids.

2. *Congenital* (*Infantile Respiratory Spasm, Congenital Laryngeal Stridor*).—Begins at or shortly after birth, when the child is a few weeks old, with laryngeal or stridulous breathing. A functional neurosis, pathology not yet determined, and recovered from by natural development in the course of the second year, disappearing before 18 months. A valvular formation of the larynx has been observed.

3. *Reflex* spasm—*i.e.*, dyspnœa from enlarged bronchial or mediastinal glands. Sudden death has occurred from spasm of the glottis in cases of tuberculosis, with enlarged and caseous bronchial or mediastinal glands.[a]

[a] Dr Ashby cites two cases :—

(*a*) A child aged one year and eight months died from croupy symptoms, in spite of tracheotomy. The *post-mortem* examination showed an enlarged thymus gland filled with a tubercular abscess, and a cheesy adherent lymphatic gland was found pressing on the trachea down to its bifurcation.

(*b*) A boy aged three years, who was affected with croupy symptoms and choking during meals, died. The *post-mortem* revealed enlarged mediastinal glands, and an abscess pressing on the œsophagus and trachea, from Potts' disease of the seventh cervical and third upper dorsal vertebræ.

The diseases, therefore, which confront us in the cases of croupy symptoms are chiefly two:—*Laryngitis Stridulosa* and *Diphtheria*, the remaining forms being more easily differentiated.

Their management is as varied as their severity. The laryngismus of infants is cured by fresh air at the seaside, cold salt douches, meat juice, and remedies which control the nervous instability of the underlying rickets or tuberculosis. No attempt at hot rooms or steam should be permitted.

In *Laryngitis* the points to be relieved are swelling of the mucous membrane and spasm. The first may be eased by a purgative dose of calomel, leeches to the throat, bleeding, ipecacuanha, and especially antimony. In a doubtful case, where the disease was violent last year, I saw great benefit follow the exhibition of gr. $\frac{1}{48}$th of apomorphia with each dose of antimony.

Spasm can be relieved by hot sponges, steam, and it is possible that phenacetin or antipyrin carefully given may be useful.

In suspected cases of *Diphtheria* (and there is always suspicion) antitoxin should be given at the earliest sign of laryngeal mischief (2,000 units for a child two years old, or 1,500 every morning for four days). This is our sheet anchor. It has also allowed cases to tide over the crisis with intubation, which formerly died.

Should these or other measures fail, and the child be in danger of choking, the question of surgical interference arises.

There still remain intubation and tracheotomy. The surgeon is required only when sufficient air cannot enter, and the child is choking from asphyxia ; but the physician has the responsibility of summoning him. What, then, are the signs of approaching asphyxia? Two especially of the foregoing croupy symptoms.—They are—(1.) *Recession* of the chest, and

(2.) *Restlessness;* and these to my mind form the most correct indications for the further admission of air. These signs should be watched, for in fatal cases the recession increases, the head is thrown back to straighten out the trachea, the restlessness gradually gives place to unconsciousness, and the child dies asphyxiated in convulsions.

Intubation is a delicate and intricate proceeding. I have seen it tide over the crisis successfully where antitoxin had previously been given. Tracheotomy, on the other hand, is the more usual, but its results have not been hitherto encouraging.

Dr. Stokes says:—" On the performance of tracheotomy in this disease I have little to say more than express my decided dissent from it." (Diseases of the Chest, p. 219. 1837.) And almost prophetic is the advice of Mr. William Henry Porter :—" Medical men should rather turn their attention to the improvement of that internal treatment which will generally be efficacious if resorted to in time, than to look for advantage in the performance of an operation from which experience holds out such slender hopes." (Surgical Pathology of the Larynx and Trachea. Dublin, 1826.)

These quotations are 63 and 74 years old, but until the recent fulfilment of Mr. Porter's prophecy by the introduction of antitoxin, nothing has occurred to warrant the rejection of their conclusions. Now, however, we are entering on a new era in the pathology, prognosis, and treatment of these diseases, and under antitoxin tracheotomy may become more successful.

The following conclusions may, I think, be drawn:—

1. That there is no such true disease as croup, croupy symptoms being produced by a variety of different diseases.

2. That severe croupy symptoms are most likely to be due to either diphtheria or laryngitis stridulosa.

3. That in difficult and doubtful cases we should suspect diphtheria, and treat it as such from the start with antitoxin.

4. That recession and restlessness are the two most dangerous symptoms.

5. That as antitoxin reduces the mortality of diphtheria, and enables cases to be tided over the crisis by intubation, it may possibly contribute to the future success of tracheotomy.

6. That the deaths registered as croup are mainly due to diphtheria.

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Dr. Travers Smith spoke.

Dr. Drury asked what class Dr. Symes would put those cases under in which they had laryngitis closely resembling what they used to call croup, and which they met with in measles.   He saw an enormous number of such laryngitis cases in the last epidemic, and such a number of tracheotomies had to be performed that almost all the tracheotomy tubes to be obtained in Dublin had been used up.   At one time there were some 25 to 30 cases all with tubes in, but they were not diphtheritic cases, nor were they laryngismus stridulus, and most of them recovered.

Dr. Doyle recommended the use of sulphate of copper in croup.

Sir George Duffey said he quite agreed with Dr. Doyle as to the benefit of sulphate of copper in such cases as contrasted with depressant emetics.   He believed they were often inclined not to give enough antitoxin, and he had never seen any bad effects follow its administration.

Mr. Croly spoke.

Dr. Parsons said that from his point of view diphtheria was an inflammation produced by the Klebs-Löffler bacillus, and it did not make any difference whether the inflammation was catarrhal, croupous or diphtheritic.   Some other name would then have to be found for those cases of inflammation of the throat produced by other micro-organisms.   Similarly, in a recent paper, Dr. J. W. Moore pointed out that the clinical term pneumonia covered a great variety of diseases, as well as the inflammation produced by the diplococcus pneumoniæ.   In addition to Dr. Symes' two indications for surgical interference he thought they might also add cyanosis.

Dr. J. W. Moore said they would all agree with Dr. Travers Smith that the dyspnœa of diphtheria was not a night symptom, whereas that of laryngismus stridulus was essentially a night symptom. He agreed with Sir George Duffey in believing that diphtheria is often apyrexial, and if they had high fever it was probably not diphtheria. The absence of knee-jerks, however, as well as albuminuria, only appeared after toxic poisoning had taken place, and, therefore, were not reliable indications early in the disease.

Dr. Langford Symes, replying, said he believed there were many varieties of the disease commonly called diphtheria. Why the night attacks which he had mentioned came on he could not tell, and it could not be said that they were indicative that the case was not diphtheritic, because he thought it was possible that a diphtheria case could have a violent spasm of the larynx as well as another.

PEMPHIGUS WITH ERYTHEMA CIRCINATUM.

By HENRY C. DRURY, M.D. (Univ. Dubl.), F.R.C.P.I.;

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Assistant-Physician to Sir Patrick Dun's Hospital, Dublin.

[Read in the Section of Medicine, April 6, 1900.]

M. R., aged fourteen, was admitted to Sir Patrick Dun's Hospital
on August 15th, 1899. I saw him in the hall the day before, and
offered to take him in, but he did not come till the next day. On
the 14th, when he presented himself first, he had a scanty eruption
on the face, chest, and arms, consisting of groups of small vesicles
for the most part the size of boiled sago grains, some few being the
size of small peas ; there were a few on the eyelids and cheeks,
also a few scattered about the chest and arms. He complained of
having felt weak and not well for the past two or three days, but
said the spots had only appeared that morning or during the pre-
vious night. He said his legs and feet had been swollen for a few
days, and that his arms and hands felt so, though in reality they
were not.

He was a small sized, delicate looking boy, but well nourished,
and well cared for.

A year ago he had, so he stated, rheumatic fever, and in support
of this there was found a well-marked mitral systolic murmur.
The pulse, however, was quiet and regular, and there was no
œdema of the lower extremities.

The family is a peculiar one ; the mother is a fragile, delicate
looking woman, with paralysis of the left third nerve ; two sisters
are epileptic.

Aug. 15th.—When examined on admission it was found he had
developed a most extensive gyrate or circinate erythema over the
entire trunk and upper parts of arms and legs. This consisted of
larger and smaller circles, sharply marked off from the healthy skin
by a distinctly raised margin. These circles were of a bright red
colour, somewhat paler in the centre than at the margins ; some were
separate, but many coalesced, forming large, irregular gyrate patches.
The amount of surface involved by this erythema was much
greater than the area of healthy skin between. The individual

patches varied in size from that of a pea to areas two to three inches across. He did not complain of any itching or burning, but said the body felt swelled. The vesicles seen on the previous day, though still for the most part small, were a little larger than before, and on his right side near the nipple was one bulla about the size of a nut, which made the diagnosis of the previous day more certain, though the appearance of erythema was a little perplexing.

16th.—On the next day we were surprised to find that the erythema had faded, though the evidences of it had not disappeared. The whole body was mapped out by gyrate markings; the margin still could be felt by the finger to be distinctly raised; inside this the patch showed a very faint brownish discoloration, which when viewed from a distance was distinctly seen, but when looked at closely could hardly be said to be different from the healthy skin outside the bounding ridge. In addition to this, however, a great increase had occurred in the size and number of the vesicles and bullæ.

For six or seven days after admission the bullæ increased in number and size, this latter feature being due partly to increase in individual bullæ, but chiefly to the coalescing of several, so that huge irregular bags of fluid were formed, measuring in some cases as much as three inches by two inches. Many of these had the appearance of ordinary pemphigus bullæ—viz., tense, clear blebs on a slightly red base—the blebs becoming turbid, flaccid, and finally bursting or drying up, leaving the foliaceous epidermis slightly adherent to the floor. Many, however, especially the larger ones, became filled with highly sanguineous fluid, and on becoming ruptured there was considerable inflammation and ulceration.

So far as could be made out the bullæ occupied only the site of the erythematous patches before described, but fortunately the erythematous patches did not all become bullous. Isolated bullæ occupied isolated erythematous sites, confluent bullæ occupied confluent erythematous sites, but even here they did not necessarily occupy the whole of the erythematous patch.

The distribution of the bullæ was very extensive—they were present on the ears, eyelids (fortunately not on the conjunctivæ), cheeks, lips, scattered all over the trunk, front and back, one enormous one over the left scapula; all over the upper extremities except the hands, chiefly on the extensor aspect; one on the antero-internal aspect of the right forearm was three and a half inches

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long and nearly two inches across, and filled with bloody fluid ; a great number were situated about the nates and between its folds, and all over the penis and scrotum.

During the first nine days the patient's temperature slowly but steadily rose till it reached 102° F., and then gradually fell till, on the eighteenth day it arrived and remained at the normal line. The period of rising temperature was about coincident with the period during which the bullæ were coming out and developing.

The condition of the patient was wretched in the extreme. The extent and position of the bullæ were such that it was impossible to prevent their becoming broken and ulcerated, and he was so weak that he was unable to help himself, and still it was almost impossible to lift or support without doing him further injury, and preventing the healing of the ulcerated parts. Repair, however, progressed, once it began, with marvellous rapidity, and he was discharged from hospital on the twenty-first day—at his mother's desire—almost completely recovered.

The urine was healthy throughout, with the exception that it threw down a copious precipitate of phosphates.

On the third day after admission to hospital Dr. O'Sullivan kindly took some of the fluid from a bulla for bacteriological examination. He reports that he found it sterile.

The patient was put on $2\frac{1}{2}$ minims liq. arsen. hydrochlor. with iron, three times daily, immediately after admission to hospital. Four days later this was increased to 5 minims, on the tenth day it was increased to $7\frac{1}{2}$ minims, and this was continued till he left on the twenty-first day. The drug agreed well, and he improved while he was taking it. The bowels were confined throughout, and were relieved by enemata.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

By HENRY C. DRURY, M.D. (Univ. Dubl.); F.R.C.P.I.;
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[Read in the Section of Medicine, May, 18, 1900.]

EPIDEMIC cerebro-spinal meningitis was first recognised in
Geneva in 1805, and at more or less wide intervals has
appeared in larger or smaller epidemics in Europe and
America since that time. It was first recognised in
Ireland in 1846. Again in the autumn and winter of
1866–67 a very considerable outbreak occurred here, and
also in 1885–86 a minor epidemic appeared.

It is said that the Dublin epidemic of 1866-67 was the
most severe manifestation of the disease that has ever
appeared in the British Islands. Its fatality was so marked
that, with the prevalence of a hæmorrhagic rash, it was,
most improperly, called "Black Death," or more appro-
priately "Malignant Purpuric Fever."

It appears that we have entered on another epidemic of
this disease in Dublin, so far of a comparatively mild type,
but not, as yet, extensive, and since hitherto it has appeared
to be favoured by cold, wintry weather, we will hope that
the present small epidemic will decrease rapidly with the
near approach of summer.

The essential morbid condition is an inflammation of the
membranes of the brain and spinal cord. If death has
occurred early in the disease, nothing more may be
apparent to the naked eye, in these parts, than some hyper-
æmia of the membranes; but, as is more usual, where
death has been delayed for some days, pus is found at the
base of the brain or over the hemispheres, or in both places,

and extending down the cord to the cauda equina. There is nothing in the naked-eye morbid appearances to distinguish epidemic meningitis from any other non-tubercular meningitis of the brain and cord.

The pus, or cerebro-spinal fluid, contains, however, a coccus, described first in 1885 by Leichtenstern, later and more fully in 1887 by Weichselbaum, who called it " Diplococcus intracellularis meningitidis." This somewhat resembles the diplococcus of pneumonia, and as a meningitis sometimes occurs with pneumonia which yields the diplococcus on examination and, as, again, a pure cultivation of this pneumococcus injected into the cranial cavity of certain animals produces meningitis, and into their lungs produces pneumonia, it was, and is still, considered by some that epidemic meningitis was produced by the pneumococcus infecting the meninges of the brain and cord, and not by a coccus peculiar to itself.

But there are certain salient features, more suitably dealt with by the pathologist than by the clinical physician, which serve to distinguish the two. Suffice it to say that its mode of growth, the media most suitable, and the stains to which it is susceptible or insusceptible, make it practically certain that the diplococcus of pneumonia and the diplococcus intracellularis found in epidemic cerebro-spinal meningitis are not identical. A case which I will mention later on illustrates this contention in a very striking manner.

Of the ætiology of the disease we know practically nothing. A diplococcus has been isolated (discovered in 1887, confirmed in 1895) which it is believed is the undoubted immediate cause, but where the coccus comes from and how it is transmitted is still a mystery. Jaeger, who made an elaborate study of the disease in the German army, found that cases, apparently sporadic, really radiated

from a common centre, and that these sporadic cases formed new centres from which the disease again radiated. He believed that the organisms lay latent for long periods in dust. Dr. Upham, who had great experience of epidemics in America, says:—" The cases are distributed amongst all classes and grades of society—the high and low, the rich and poor; locations unexceptionable for situation, open to abundant light and air, and the pent-up hovels of the lowly and wretched, have all contributed to the material of the epidemic. We believe, therefore, that the primal origin of the disease is atmospheric, and, for the present, beyond our ken." This was before the discovery of the diplococcus, but it otherwise expresses pretty well our present knowledge.

There is a general agreement, amongst writers on the disease, that it is not contagious. Leichtenstern found that in 180 cases in which the dwelling could be ascertained, 150 came from separate houses. Vieusseaux says that the attendants on the sick, and the neighbours, remain free from it. Berg, in the New York epidemic of 1893, could not find a single case in which two or more members of the same family were affected. Richter, however, believes that it may be contagious, and gives instances. It was pointed out by Scherer in 1895 that the organisms are found in the nasal secretions, and that this is one of the principal channels for its dissemination. Dr. O'Sullivan has examined some of this secretion for me, and will give his results himself. It is conceivable, also, that in cases of otorrhœa we may have another source of infection, and again where the lungs are affected the expectoration may be a source for the dissemination of the infection.

Certain diagnosis before or after death may be made by an examination of the fluid present in the spinal canal, as obtained by the method of " lumbar puncture," without any ill effect to the patient before death, and

without the necessity of an ordinary *post-mortem* examination after death. This lumbar puncture is performed by introducing a carefully sterilised aspirator needle between the spines of the 2nd and 3rd or 3rd and 4th lumbar vertebræ in the middle line. The body should be bent forward in order to obtain more room, and this is the only difficulty met with before death, as there is usually, if not actual opisthotonos, at least rigidity of the spinal muscles, which may make it impossible to get the body curved forward. The operation is little more painful than an ordinary hypodermic puncture, and a period of insensibility during the course of the disease may be utilised for the purpose; if not, and the patient appears partly conscious, slight freezing of the skin will allow of the puncture being made without the patient feeling it at all. In the fluid obtained will be found the "diplococcus intracellularis" if the case be one of epidemic cerebro-spinal meningitis.

The symptoms of the disease are, briefly, those of meningitis with various special peculiarities, some of which are usually present. Of these, sudden onset is very characteristic and a most important diagnostic symptom. Early retraction of the head is important and very constantly seen; the spasm may extend to the back muscles, causing opisthotonos. These conditions are produced by irritation of the spinal nerves as they pass through the membranes. To the same cause is due the pain complained of, especially in the limbs, and the hyperæsthesia of the whole surface of the body.

Herpes labialis is also very frequently present, and often very extensive; it is more constant than any other skin affection; herpes may appear not only on the lips and nose, but on other parts of the body. Leichtenstern found it in 26 out of 29 cases.

An eruption of petechial spots is so constant in some

epidemics, that the early American name for the disease was "Spotted Fever," and with us "Malignant Purpuric Fever." This rash may appear early and be very copious, but bears little relation to the severity of the disease; it may, moreover, be entirely absent, and is really an unimportant feature. One observer found it in only 4 out of 80 cases. Vieusseaux does not mention skin lesions at all, so we may infer they were not present in his cases. Very few have been met with in the present epidemic. In no case has the diplococcus been obtained from a skin lesion.

Inflammation of the conjunctivæ, of the iris, or of the whole uveal tract, leading to destruction of the affected eye, is not unfrequently seen; usually only one eye, and that the right, is attacked (Grimshaw).

Deafness is also frequent, with or without purulent discharge from the ear. Recovery from this may occur wholly, in part, or not at all.

Not unfrequently there is swelling and redness of some of the joints like that of acute rheumatism. This may be due to a serous effusion which may quite disappear, or to a purulent effusion which may disorganise the joint.

It is not uncommon to meet with either broncho- or lobar pneumonia at the commencement of, during the course of, or late in the disease. Cases of this sort having been verified by *post-mortem* examination, or by lumbar puncture and subsequent microscopic examination, it is certain that they were not merely cases of ordinary pneumonia with accidental meningitis, but that the meningitis was the essential feature and pneumonia the accidental complication.

CASE I.—The first case I met with was in November last. The patient, M. D. (male), aged twenty, was sent to Cork-street Fever Hospital on 18th November, 1899, by Dr. Nesbitt Wynne. I must here confess that it was only in the light of subsequent events that I came to the conclusion that the case was one of epidemic cerebro-spinal meningitis.

The history we obtained was that he was at his business—as grocer's assistant—quite well, till Wednesday, when he complained of headache and vomiting. By Thursday morning he was unconscious, and wildly delirious on Friday. He had no diarrhœa, a very slight cough, and slept very little. He was admitted to hospital on Saturday, and was still in a wildly delirious condition, requiring a special attendant. There was a copious eruption of herpes on both upper and lower lips on right side. There was internal strabismus of left eye—some of his friends said he always had this; others were positive he had not had it before! Nothing abnormal could be found in the lungs. Heart sounds were healthy and good. Abdomen was not distended. There was a tympanitic note over the splenic region, and dulness along the ascending colon. The tongue was furred, but stripping. There was no rash. The motions caused by a purgative were formed and dark. There was a small septic blister on right wrist. The temperature—at first 104·5°—and pulse 84, were, on the evening of second day, temperature 98°, pulse 116, showing thus a marked want of harmony. For six days the delirium continued, requiring sedatives to procure any degree of rest, becoming, however, quieter and more easily controlled from day to day. He then lay in a condition of absolute unconsciousness, passing all evacuations under him, the bowels, however, never acting except after purgative medicine, and the motions always being of a dark character. There was rigidity, but no actual retraction of neck and back. On the 16th day one doubtful " rose spot " was found on the abdomen, but it was noted at the time with a " query," and no others appeared. His temperature ran a rather irregular course, rising little above 102° till the 16th day; from that gradually but irregularly subsiding to normal on the 40th day. The pulse, though regular in rhythm, showed through the whole course of his illness great variation in frequency, being sometimes 84, at other times 110, and this variation being noticed in the course of a few hours. The extremities were always cyanosed and cold. During the whole period of unconsciousness he took nourishment freely, and as there were no signs or symptoms of enteric he was given bread crumbs, &c., from the 27th day onward. On the 31st day he was given coffee, and, by a curious coincidence, he that evening became quite conscious and remained so; but also it was found that he was quite deaf. He had developed a purulent otitis in right ear about the middle of his illness, but was deaf in both ears. He was allowed up on the 43rd day of his illness, a

shadow of his former self, for though he had taken abundance of nourishment freely throughout his illness he had emaciated with great rapidity and to an extreme degree. He left hospital on 4th February, 1900, three and a half months after admission, but deaf and with left internal strabismus. I heard a short time ago that he was still deaf.

The case is of great interest from the diagnostic point of view. Apart from early delirium, followed by continued unconsciousness and slight rigidity, he had no meningeal symptoms. Though typhoid symptoms were absent, the temperature chart and gradual recovery drove us to the conclusion that it must be an erratic case of enteric, for want of a better diagnosis. But as I have said in the light of subsequent cases, the sudden onset, the stupor, the herpes, the pulse, the profound deafness without apparent cause, the great emaciation, lead me to believe that the case was really one of epidemic cerebro-spinal meningitis.

CASE II.—The second case was a boy, J. M'C., aged twelve, admitted to Cork-street Fever Hospital on 20th Feb., 1900, being the 2nd day of his illness. He had all the appearance of one suffering from pneumonia, and some dulness and bronchial breathing were found at the left apex. The history we got was that he was a healthy boy, and went to bed as usual on Friday, and that on Saturday morning he was not able to raise his head with headache, back and front, and had vomiting and shivering. When admitted on Sunday, the second day of illness, he had a very extensive eruption of labial herpes extending up to the ala nasi. There was great retraction of the head. The pupils were dilated, and accommodated well and equally to light. He was somewhat deaf, but quite intelligent. On attempting to sit up he became white and faint. Complained of pains in his legs. There was no paralysis, but well-marked hyperæsthesia. No pain could be elicited by deep pressure along the back of the neck, and though the head was kept strongly retracted the neck muscles did not appear to be in spasm, but rather relaxed. Physical examination of the chest after two or three days gave negative results, but the temperature did not show any crisis of pneumonia. After a short time he became delirious every night, though quite sensible in the morning. He

answered questions intelligently, though it was noticed there was a
long interval between question and answer, and the deafness had
increased.   Up to the 22nd day he appeared to be no worse, but
if anything improving, when he rapidly became unconscious and
appeared to be dying.   He rallied, however, towards morning, and
improved again, becoming conscious after a couple of days.   He
vomited occasionally, had the head still strongly retracted, the
legs drawn up, and Kernig's sign of meningitis well marked.   On the
29th day he again became worse, soon was collapsed, unconscious and
apparently dying, but again rallied.   About this time a peculiar
eruption appeared.   It was thickly scattered about the whole of
both legs, particularly on the extensor and outer aspects.   It con-
sisted of small pustules, varying in size from a pin's head to a large
hemp seed, and each one contained blood as well as pus, so that the
whole had a very dark petechial appearance.   They had a con-
siderable thickness of cuticle over them, so that few ruptured and
none ulcerated.   They gradually dried up, leaving black scabs,
which remained a long time before falling off.   The temperature
throughout ran a very erratic course, varying from 104° to 97° F.,
there being often $4\frac{1}{2}$ degrees between morning and evening
temperatures.   The pulse also seldom rose above 100, thus
bearing little or no relation to temperature ; even when at his
worst it was only 72, though when apparently not worse than usual
it was 144.

Decided improvement appeared to set in about the 30th day of
his illness, and slowly continued, so that he left hospital after
about $2\frac{1}{2}$ months, well.   The retraction gradually disappeared,
though Kernig's sign was for a long time well marked.

He continued somewhat deaf, though less so than he was.   There
was a slight discharge from one ear only.   He became bright and
intelligent, and lay reading a book on the 47th day of his illness,
but he was extremely weak and emaciated.

I did not do lumbar puncture in this case, as I did not care to
do so at the time on a conscious patient, and his unconscious con-
dition was so sudden and unexpected that I was unprepared, and
there seemed every prospect of further opportunity, which, how-
ever, fortunately for him, did not occur.

The case is interesting in the early and persistent
retraction of the head, the herpes, the unexpected and
almost fatal relapses, the early condition resembling pneu-

monia, the peculiar rash, the deafness, and finally the progress towards recovery.

CASE III.—The third case was a man, J. O'T., aged forty-eight, a gardener, admitted to Cork-street Fever Hospital on 2nd March, 1900, being the 9th day of his illness.   The history we got was that he was a steady, temperate man.   As to his illness, we could only learn that he had been ill over a week, had had shivering, pains in general, and cough.   He had never had otorrhœa; had had rheumatic fever   When admitted on the 10th day he appeared to be uncon-scious, but on asking a question in a loud voice he turned his eyes on one in a wandering manner and answered.   He said he had no pain, but the frown on his brow and the frequent passing of his hand in a weary manner across his forehead, belied this.   He was extremely restless, never remaining for 30 seconds in one position, rolling from side to side, moving his legs up and down, or to one side or other, pushing down the clothes, pulling them aside, &c. His extremities were cold and blue, and could not be warmed.   His temperature was normal, and pulse also normal and of fair volume. Examination of heart, lungs, and abdomen yielded nothing abnor-mal; there was no rash and no herpes on lips; no septic lesion. He resented examination.

The next day his temperature was 100·5°.   He had marked retraction of the head, was still unconscious, with cold extremities, and restless.   There was evident hyperæsthesia.   That evening the temperature fell to 97·5°.   He was quite unconscious next morning, as he was also the following day, and died mid-day follow-ing, the 14th day of illness, the 5th day in hospital.   His tempera-ture ran up on the morning of his death from 98·6°, the night before to 102·2°, and pulse to 120.   There were no convulsions nor paralyses.

Leave to make a *post-mortem* examination was refused—later it was given, and the brain was hurriedly examined.   A thick layer of pus was found on the convexity, particularly along the longitu-dinal fissure, extending back to the cerebellum and down to the medulla.   The cord was not examined, and by a mistake the pus was not kept for further examination, as I had left, hearing there could be no *post-mortem*, and consequently had given no instructions. There was no sign of tubercle, no sign of middle ear disease, nor of abscess.

The case is of interest, in the fact of absence of any

striking meningeal symptoms till as late as the 11th day,
but then their appearance rendering a diagnosis easy;
absence of herpes and rash. *Post-mortem* examination con-
firmed a diagnosis of meningitis.

CASE IV.—The fourth case was a man, aged twenty-one, a
labourer, admitted to Cork-street Hospital on the 26th February,
on the 15th day of his illness. The history was that for a fortnight
he had been ill with pains in the head and back and slight cough,
and occasionally feverish.

Physical examination of all the organs of the body failed to locate
any morbid condition. He had a temperature of 102°, but a quiet
pulse of about 80. He complained of persistent pain in the head, in
the neck, and back. He had some retraction of the head, which in
a few days became marked. The pain, though continuous, at times
became very bad and unbearable—*e.g.*, on the 27th day he had
intense headache; on the 34th day had severe headache and vomit-
ing; on the 49th day he had intense headache, pain in back and limbs,
and coldness of extremities; on the 54th day he was crying out
with pain in back of head and neck, and also had pain in legs.   At
no time had he any nervous or other symptoms except that Kernig's
sign was always well marked.

The temperature for the greater part of the time (54 days) was
normal or subnormal, but for the first three days it showed
irregular variation from 102° to 99°; on 23rd day it rose to 101°,
and remained up for 3 or 4 days. During this time he always
appeared worse, though the periods of extreme pain did not coincide
with the high temperature.   The pulse throughout showed a marked
want of proportion to temperature; it was usually about 70, and
never rose above 84.

The case appears to be one of those chronic cases which
it would be exceedingly difficult to diagnose were it not
that there was an epidemic with us. He has not had
herpes, strabismus, rash nor delirium, nor had he any signs
of tuberculosis.

CASE V.—The fifth case which appeared in Cork-street Hos-
pital was under the care of my colleague, Dr. Cosgrave, who has
kindly allowed me to mention it. A man, E. M'C., aged nineteen
and a half years, a labourer, admitted 21st March, on the 4th day

of illness. He was quite well till four days before, when he complained of headache and pain in back. Two days later he became delirious. He was admitted in a wildly delirious state on the 5th day, with retracted head, the temperature 102°, pulse 120. No organic disease could be found. The delirium quieted into stupor, and he died on the 6th day. No *post-mortem* could be obtained.

Case VI.—The sixth case was a young girl, aged twelve, admitted Friday, 4th May, had become very ill on the previous Tuesday, 1st May, with great pain in head and back, and was delirious when admitted. Through the succeeding nine days the following symptoms were noted:—Kernig's sign well marked, tenderness of dorsal spine, spasmodic twitchings of arms and legs, extreme hyperextension of great toes, a transitory left external strabismus (on 5th), conjunctivitis of right eye (on 7th), periods of great delirium or irritability with sensibility, great retraction of head and opisthotonos (from 9th). Pulse rate very variable; on one day, when taken every few hours, it was found to vary from 72 to 120. The pupils variable, unequal, reacting to light, but then dilating even in bright sunlight. She became gradually worse, the temperature had quite an erratic course, and was lower toward the end. Lumbar puncture was performed on the 11th day, but no fluid was obtained, probably owing to the difficulty encountered. She happened then to be semi-conscious and hyperæsthetic, with opisthotonos. The skin, therefore, where the puncture was made, had to be partly frozen, so the puncture was not felt, but the back could not be curved forward, consequently there was little or no room for reaching the canal with the needle. Death occurred on the 13th day, and no *post-mortem* could be obtained.

Case VII.—The seventh case was a female child (C.C.), aged nine. She was admitted on May 12th, having been perfectly well till the day before, when she vomited, complained of bad headache, and resented being touched on any part of the body.

After admission she rapidly became worse, with great hyperæsthesia, extreme opisthotonos, and delirium. A large herpetic rash appeared on the lips, and a similar one on the back of the left hand.

She died on the 5th day of her illness. *Post-mortem* examination showed a large quantity of pus and cloudy cerebro-spinal fluid about the meninges of brain and cord. A specimen was taken for

microscopic examination, but met with an accident, and no more could be obtained.

CASE VIII.—The eighth case, a female child, aged eight, was admitted also on May 12th, and had a similar history of sudden onset. The symptoms, though not so acute, are very typical. Extreme retraction of the head, opisthotonos, great irritability and hyperæsthesia, sudden cries, periods of unconsciousness, and periods of delirium. She is still living, but the prognosis is quite uncertain. Owing to the opisthotonos and irritability lumbar puncture has not been performed.

Another case of meningitis, which proved to be not of the epidemic form, has been referred to, and is so important that it must be mentioned in some brief detail.

CASE.—A man, aged fifty, was admitted with pneumonia. He had his crisis, and was up and about for a week, when on 22nd day he complained of great headache, rapidly developed symptoms of acute meningitis, and died on the fourth day. I looked on the case as probably one of cerebro-spinal meningitis. A *post-mortem* was made, and a large quantity of pus was found on brain, and also a large vegetation on the ventricular aspect of the aortic valve. This and the pus, with part of brain, I gave to Dr. O'Sullivan, as probably a case of cerebro-spinal meningitis, without making any mention of preceding pneumonia. He reported the presence of pneumococcus only in great abundance, both in the pus and in the aortic vegetation.

The points of extreme interest are :—(1) Pneumococcic infection of aortic valve, followed by pneumococcic meningitis 13 days after crisis ; (2) absolute diagnosis of pneumococcic meningitis rather than cerebro-spinal meningitis by a pathologist unaware of history of pneumonia, and looking for cerebro-spinal meningitis ; (3) the extremely acute onset and course, with unmistakable meningeal symptoms, making the diagnosis impossible without the aid of microscopic and bacteriological investigation.

The temperature charts of the above cases have not been brought forward, as they present no features of diagnostic

interest, being quite erratic and bearing no resemblance to one another in any other particular.

Dr. O'Sullivan having kindly undertaken the pathology of the cases, with several others that he has met with, I have left it entirely to him to speak on that subject.

SOME RECENT LITERATURE.

1. Sanitary Commissioners (India) Report, 1897.
2. Wentworth. " Lancet," Oct., 1898.
3. Councilman, Mallory, and Wright. Report of the State Board of Health of Massachusetts. Boston, 1898. (The most useful monograph on the subject I have met with.)
4. Osler. " Boston Med. and Surg. Journal," December, 1898.
5. Buchanan. " Dublin Journal of Medical Science," Feb., 1899.
6. Osler. Cavendish Lecture. " Brit. Med. Jour.," June, 1899.
7. Jaeger. " Deut. medicinische Wochenschrift," July, 1899.
8. Netter. Twentieth Century Practice of Medicine.

EPIDEMIC CEREBRO-SPINAL MENINGITIS IN DUBLIN.

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AND

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IRELAND has been free from cerebro-spinal meningitis in its epidemic form since 1886. The present outbreak commenced in the earlier months of this year, and I shall briefly refer in chronological order to the clinical records of the cases which have come under my observation at the Royal City of Dublin Hospital.

CASE I.—E. D., aged twenty-eight, a servant, was admitted to the ophthalmic ward on January 31st, complaining of seeing double. She was in good health till January 5th, when she had a shivering fit, followed by severe pain in the back of the head and vomiting. Her temper became irritable and uncertain. On January 23rd, as she developed diplopia, Dr. Flood, under whose care she was, asked Mr. Benson to see her. He found that in the right eye the vision was $\frac{1}{12}$, while in the left eye it was nearly normal. In both eyes there was optic neuritis, of a very intense character in the right, with œdema of the disc and retina, a large patch of white exudation above the disc, and a great tortuosity and enlargement of the veins. There were no hæmorrhages in the retina. She was removed to the City of Dublin Hospital. I examined her carefully, but failed to find any symptoms or signs beyond those enumerated—headache, chiefly in back of head, vomiting, diplopia, slight strabismus, and intense optic neuritis. The temperature, Dr. Flood informed me, was never higher than normal, and the pulse, always quiet, about 80. While in the hospital all the symptoms gradually subsided, the diplopia disappearing about
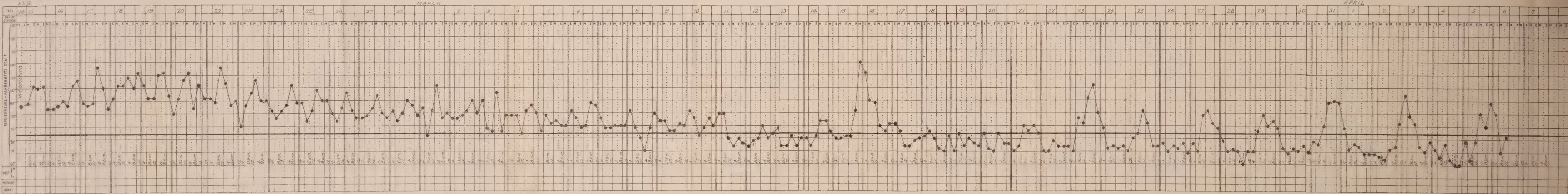
PLATE I.

Case II.—D. S., aged seven. Kernig's Sign. Recovery.

CASE II.—D. S., aged seven years. Temperature at first like typhoid fever, but subsequently simulating tertian ague. Recovered.

February 12th. She left on February 23rd, feeling nearly quite well, and with her sight greatly improved. After a rest she resumed work, and now feels in excellent health. She remembers very little of the earlier weeks of her illness.

On March 19th her eyes were again examined by Mr. Benson. She said she was perfectly well, but that she could not use her eyes for long without feeling them fatigued. There was a very slight haziness of both discs, most marked on the right. No exudation was visible in the retina above the disc where the large white patch existed on a former occasion. At no time was there albumen or sugar in the urine.

I was unable to arrive at any positive diagnosis in this case while she was in the hospital. The symptoms were, I thought, more suggestive of meningitis than of any other intracranial disease, but the complete recovery of the patient differed from any form of meningitis I had met. In the light of the subsequent cases there is little doubt, I think, that it was a mild attack of cerebro-spinal meningitis.

Case. II.—D. S., aged seven, residing in Booterstown, was also sent in by Dr. Flood. He was admitted on February 14th, a fortnight after the previous case. On Saturday, February 10th, he complained of a slight headache, and his stomach seemed out of order, but he did not vomit. On February 11th headache was much worse, but his mother did not think him sufficiently ill to be sent to bed. On February 12th, at 6 a.m., he began to rave, and he was unconscious by 7 a.m., when he was seen by Dr. Flood. Later during that day he regained consciousness, and complained of seeing double, and then his mother noticed that he had a squint.

Previous History.—He was in the Children's Hospital in Harcourt-street two years ago, and is said to have been operated on for morbus coxæ. In his family there is no indication of any tendency to tuberculosis.

On admission there were retraction of the head and rigidity of the neck muscles to such an extent that it was not possible to flex the head. There was extensive naso-labial herpes. The movements of the chest wall were normal, and there was, perhaps, slight retraction of the abdomen. The spleen was not enlarged, there were no spots, and I could detect nothing abnormal in the chest or abdomen. The temperature varied from 100° to 103° F. during

G

the first week in hospital, and then gradually settled down, falling about 0·2° F. each day till it became normal on March 13th. It remained practically normal till the 22nd, with one exception, when it rose rapidly to 104°, but fell in the course of eighteen hours to 98·4° again. On March 23rd, and every second day till April 6th, the temperature rose some degrees, while on the alternate days it remained subnormal. Briefly, therefore, it may be stated that during the early weeks the course of the temperature was like that of typhoid fever, but during the later it simulated tertian ague. Since April 6th the temperature has been practically normal.

On March 12th Mr. Benson examined his eyes, and found that the right disc was more vascular than the left, the edges everywhere slightly hazy, and the veins a trifle large and dark. The left disc was clear everywhere at the edge except above. There was thus very slight optic neuritis, more marked in the right eye.

On March 13th Kernig's sign was present. Any attempt at extending the limbs made him cry with pain.

On March 15th his temperature ran up to 104°, and he vomited, moaned, and complained of his head, and passed a restless night, but the following day he was as well as usual. He became greatly emaciated during his illness, but since the temperature became normal he has gained flesh. He is now in excellent health, the strabismus has disappeared, and the reflexes, superficial and deep, are quite normal, and he left the hospital May 19th. In this case there was constipation throughout, and the Widal test was negative.

Case III.—G. M‘S., aged twenty, a checker, was admitted about 9 p.m. on Friday, March 2nd, in an unconscious condition.

Previous History.—I subsequently ascertained from his father and his employer that he was apparently perfectly well till the previous Wednesday morning, when, during his work, he complained of his head and a feeling of sickness. His employer recommended him to go home, to take some hot rum, and go to bed. On Thursday he heard he was better, but on Friday so much worse that Dr. Byrne was sent for, and he recommended his immediate removal to hospital.

Condition on Admission.—He could be roused sufficiently to say that he had very violent pain in his head. He had no herpes, but there was retraction of his head and rigidity of his neck muscles. He had no indication of any pulmonary or abdominal disease, no

CASE III.—G. M'S., aged twenty years. Died.

Temperature chart showing day of disease (March 2, 3, 4) with Fahrenheit scale from 97° to 107°. Temperature declining from 104° toward 97°. Notation "Died at 1.15 a.m." Pulse readings: 106, 108; Respiration: 36, 52. Urine: Catheter.
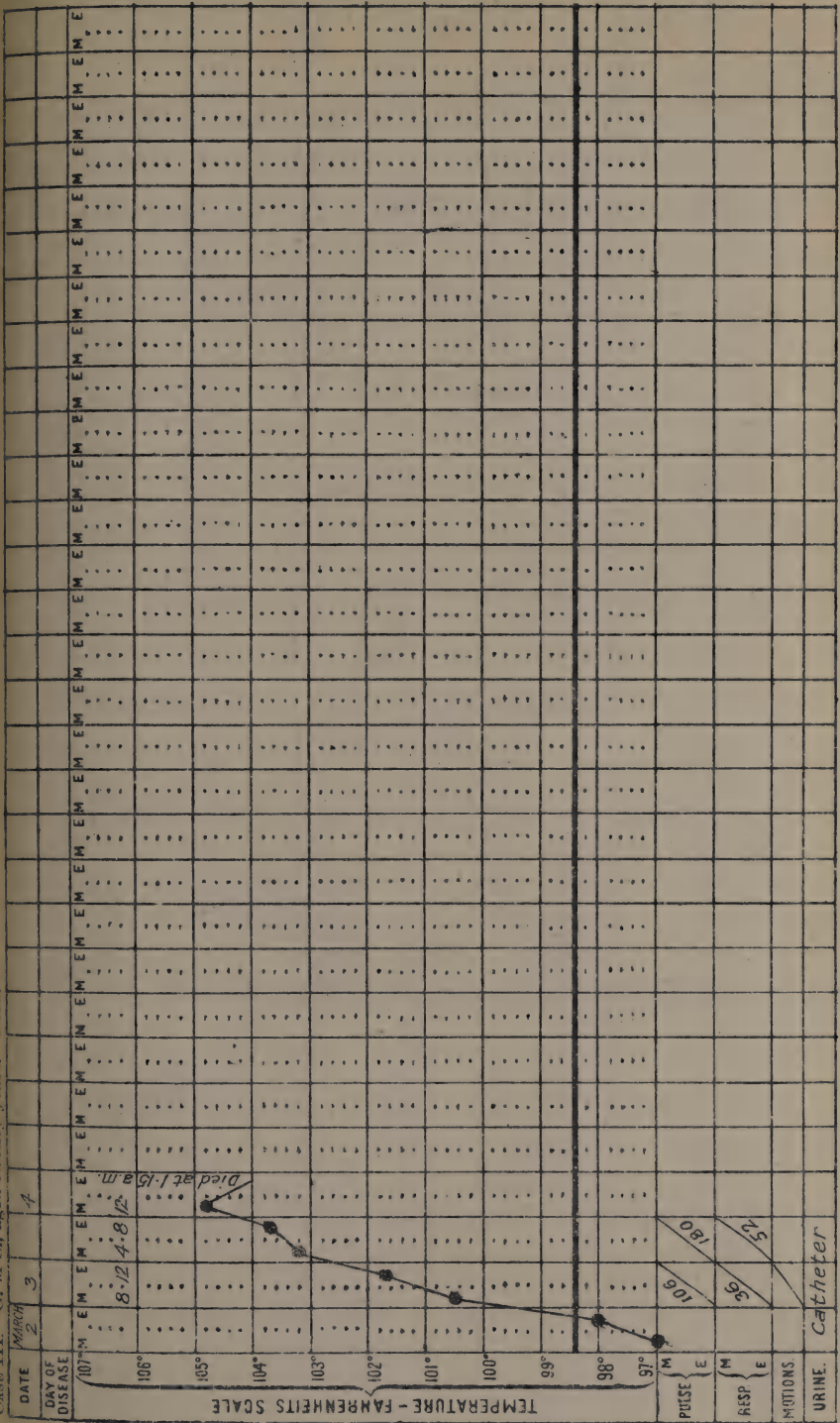
PLATE II.

Case IV.—R. M., aged twenty-two. Strabismus. Recovery.

Case IV.—R. M., aged twenty-two years. Very irregular course of temperature. **Recovered.**
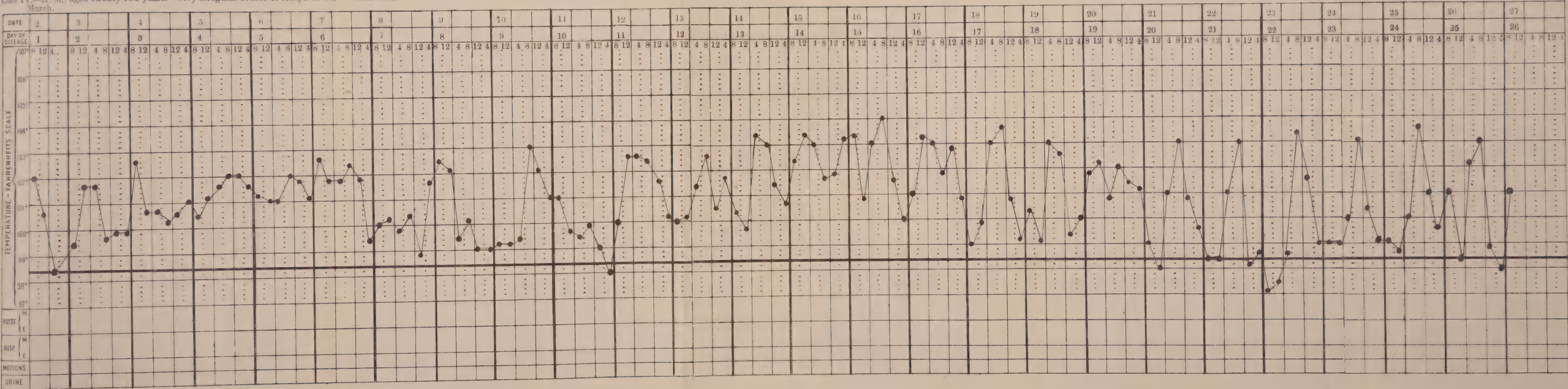
cardiac hypertrophy, and no increased arterial tension.   He had retention of urine and abolition of the knee-jerks.

After History.—On March 3rd, while drawing off the urine in the morning, my resident pupil, Mr. Wilson, was surprised to hear the air whizzing into his bladder as the urine escaped.   This rather rare phenomenon is due to the complete paralysis of the bladder. The urine was loaded with lithates, and contained a large amount of albumen.   The course of the temperature is shown in the chart [exhibited].   On the night of March 3rd he was comatose, cyanosed, and bathed in perspiration, and he died at 1 15 a.m. on March 4th— twenty-eight hours after admission and about three and a half days from the commencement of his illness.   A *post-mortem* examination was not permitted, and I regret that I did not make a lumbar puncture.

Case IV.—R. M., aged twenty-two, a cook, residing in Wellington-road, was admitted on March 2nd, complaining of severe headache and not feeling well.

Previous History.—She had a rigor the previous day at 4 a.m., followed by headache.

Condition on Admission.—When admitted some thirty hours later, at 9 p.m., March 2nd, her temperature was 102° F.   She passed a restless night, and during the following day she was vomiting and suffered much from her head.

After History.—On March 5th her headache was still very violent, and she had constant contraction and relaxation of the occipito-frontalis muscle.   She had also pain and stiffness down the spine, and very abundant naso-labial herpes.   On March 6th diplopia and convergent strabismus were present, and on March 7th retraction of the head and rigidity of the neck muscles.   The pupils were slightly unequal, and there was some difficulty in breathing.   On March 9th the eyes were examined by Mr. Benson, who noted "slight œdema of the disc, left most marked, very considerable tortuosity and congestion of the veins, even out to their finer branches; no masses of exudation or hæmorrhages anywhere visible; slight optic neuritis; venous congestion marked."

On March 13th there was complete loss of power in right external rectus.   Kernig's sign was present; she had had severe pain in left shoulder for some days past.   On March 17th the respiration was superficial, quick and snatchy.   There was twitching of the occipito-frontalis, and the alæ nasi were working.   The lips and tongue were rather dry, the pulse 102, the heart-sounds good.

There were stiffness and pain in left shoulder, and pain on pressure over the skin in the lumbar and dorsal regions. There was tremor in the lower extremities, but no loss of control over the bladder or rectum. There was no albumen or sugar in the urine, and no diminution of the chlorides. The temperature, which during the earlier days of her illness was fairly regular, varying from 101° to 103°, became distinctly remittent from March 20th till April 7th, when it became normal, and remained so. In the morning, during this remittent period, she felt perfectly well, but towards 1 or 2 p.m. the temperature commenced to rise, violent headache and vomiting set in, and persisted for some hours till the temperature became normal again. Throughout her illness her pulse rarely exceeded 100, and her respirations averaged 26. Double vision persisted after the temperature became normal, but she gradually regained power over the external rectus, and when leaving the hospital had practically recovered full control.

Case V.—A. B., aged thirteen, was carried into hospital in a very stupid condition about 4 30 p.m. on March 21st. He could give no account of himself. The temperature was 99·2° F., the pulse 88, and the respirations 28. His face was flushed; he was noisy and a little delirious. My resident pupil, Mr. Wilson, did not notice anything else abnormal. Within half an hour after his admission he suddenly became cyanosed, his pulse became weak, and he died at 5 p.m. When I saw the body at 11 p.m. *rigor mortis* was present. There was well-marked *post-mortem* lividity, but no herpes. Dr. Littledale kindly obtained some blood serum tubes, which I inoculated with some fluid removed by lumbar puncture, and he kindly undertook the subsequent examination of them. The fluid I removed was straw-yellow in colour, and almost quite clear. Permission to make a *post-mortem* examination could not be obtained.

Case VI.—M. Q., aged six, was admitted on April 17th.

Previous History.—Her mother stated that on April 14th she began to suffer with headache, vomiting, and loss of sight. She was a little easier on that night, but on April 15th she vomited every time she took a drink, and lay all day on her face, with her head thrown back and her eyes in a fixed stare. She was restless and delirious at night. On April 16th complained of severe pain in the abdomen and back, had a very restless night, as she was vomiting and delirious, and was sent into hospital on April 17th.
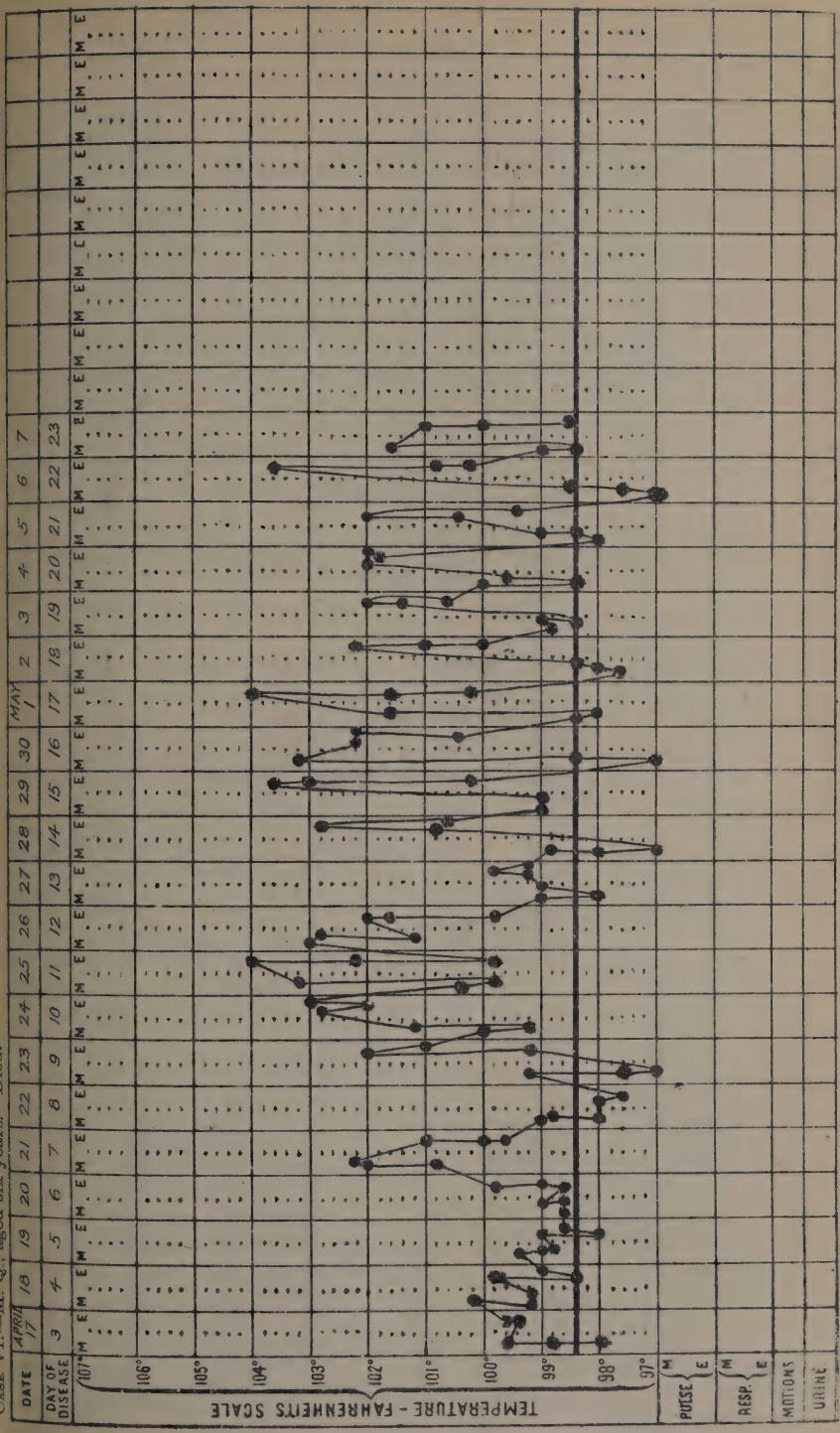
PLATE III.

Case VI.—M. Q., aged six.   Strabismus and Retraction of Head.   Died.

CASE VI.—M. Q., aged six years. Died.

Condition on Admission.—There was great retraction of the head, marked opisthotonos, so that if put on her back she rested on the occipital and gluteal regions. She had abundant naso-labial herpes, weakness in both external recti, and double vision. Kernig's sign was not elicited till the limb was nearly fully extended. The knee-jerks were slight, but flexion of lower extremities was marked.

On April 18th there was tenderness on pressure along the spinal column. Kernig's sign was well marked in the left lower extremity. She was more sensible, and was asking for whisky and water to make her warm. The urine contained a trace of albumen, but no sugar. Chlorides were completely absent. She had been grinding her teeth a great deal.

On April 19th there was a very extensive herpetic eruption over the upper and lower lips.

On April 20th the albumen had disappeared, and chlorides were present in the urine.

On April 26th she cried bitterly, complaining of pains all through her. The fundus of the right eye was examined, and it was found that the outline of the disc was almost invisible, and that the vessels were injected. Since admission she had frequently at night wakened up with a sudden shrill scream, at first "Oh, ma, ma," but subsequently it approached in its suddenness to a siren. During the next twelve days she suffered considerably from head-ache, pains in her back and extremities.

On May 8th large, coarse, involuntary movements occurred in the left arm and leg, while the right arm and leg were rigid, and the latter extended. During the day she had fits of screaming. At 11 30 p.m. she was unconscious, but the conjunctival reflex was present, and the pupils contracted on exposure to light. She was very restless during the night, continued screaming till 2 20 a.m., when she went to sleep and slept for two hours. At 4 30 a.m. she took ℥v. of milk, and then passed apparently into a heavy sleep, and remained in that condition almost from that date to May 18th. The conjunctival reflex was generally absent. The pupils contracted on exposure to light. The teeth were firmly clenched, and a little milk introduced oozed out again. Not a particle of nourishment had been swallowed for the previous ten days. If the skin were tightly pinched she moaned a little and moved to a very small extent. Some foul-smelling fluid trickled out of her mouth. The evacuations were passed under her. She had been fed by nutrient

enemata during these ten days. Her pulse increased in frequency
from 84 to 120, her respirations continued quiet, and her temperature
was generally 101° in the evening and lower in the morning. On
the 19th and 20th May she occasionally opened her eyes, but
otherwise her condition was practically unchanged. There was
well-marked strabismus, and the knee-jerks were absent.

· Since the above note was written she remained in a semi-
conscious condition, apparently deaf, absolutely unable to swallow,
and with partial right hemiplegia. Gradually becoming weaker
and more emaciated, she died on June 15th.

CASE VII.—T. Q., aged five years, brother of the previous
case, was admitted on April 18th. He had been ill for two days
before with headache, pain in the back of his neck, and vomiting.

Condition on Admission.—He had marked retraction of the head,
and herpes was just appearing on his lower lip. He lay in bed
turned three-fourths over on his chest. He showed extreme retrac-
tion of head and arching of the back, and the thighs were flexed on his
abdomen. The pupils were equal, and their movements apparently
normal. Kernig's sign was present. The urine contained neither
sugar nor albumen, and chlorides were present.

On April 20th he was almost incessantly screaming. There was
extreme retraction of the head, so that it formed an acute angle
with the back, and the chin was pointing upwards. The thighs
were flexed on the abdomen. An ophthalmoscopic examination
showed a haziness of the outline of the disc, but no pronounced
optic neuritis.

May 17th.—At times he has become pale, cold, collapsed, and
looking as if he were dying, and in a few hours' time his colour
has been good. His pulse is easily counted, and he is warm. He
has not passed for any length of time into the unconscious condition
of his sister. The temperature, which has been very irregular, is
now, I think, settling down. He is sleeping well at night, and
taking nourishment fairly well.

June 15th.—He made an excellent recovery.

I shall now briefly refer to a few points.

Ætiology.—Numerous outbreaks have occurred on the
Continent and America, while England has escaped to a
remarkable extent. The outbreaks have generally appeared
as waves passing over a district, and not returning for
years.

PLATE IV.

Case VII.—T. Q., aged five.   Usual Decubitus.

Case VII.—Retraction of Head and Arching of Back.   Recovery.

Case VII.—T. Q., aged five years. Recovered.
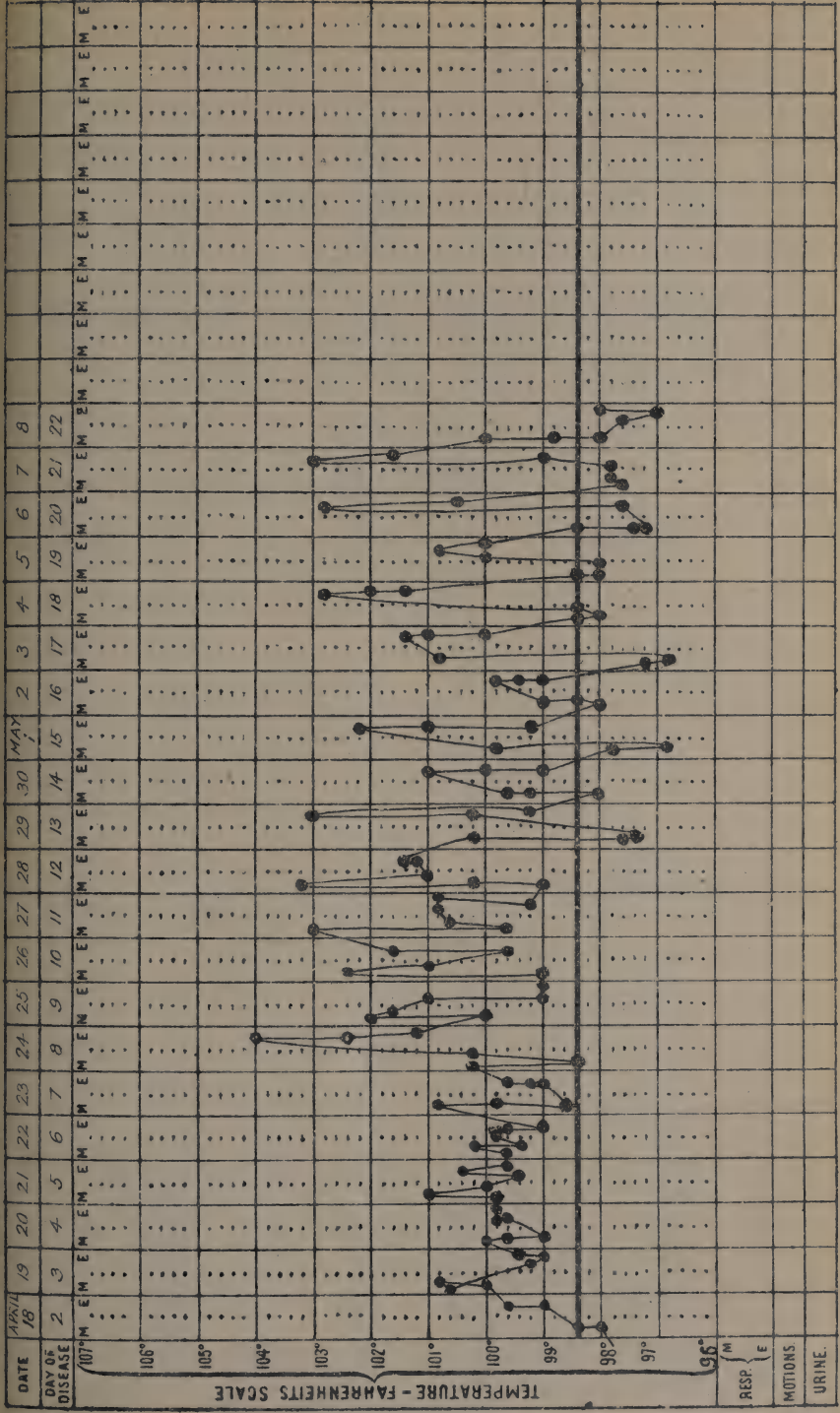
Age.—The incidence is chiefly on children and young adults. It rarely occurs after thirty-five.

Season.—It is most common in spring. It has been thought to follow in the wake of cholera and measles, and to be closely connected with pneumonia.

Bacteriology.—Evidence is steadily accumulating that its immediate exciting cause is the Diplococcus meningitidis intracellularis. It has been suggested that this organism may be found in the nasal secretion, and that by this route it probably reaches the brain. I have examined the secretion in two cases; in one there were numerous diplococci, in the other they were very few. I do not think they were the diplococcus intracellularis.

Diagnosis.—The onset is sudden and definite. The patient can fix to the hour the time that he was seized with the headache.

Temperature.—There is no constant type. In some cases it resembles typhoid, in others malaria.

Decubitus.—The patient generally lies on his side with his head retracted, chin pointed, and lower extremities flexed on the abdomen.

Kernig's sign has been present in all the above cases in which I have looked for it. I have tried patients with various other diseases, but never elicited it. I have noticed it as early as the third day, and it has been present even after convalescence has set in, diminishing as the patient got well. I have not been able to elicit a corresponding spasm in the upper extremity, though I looked for it in some of the cases.

Knee-jerk diminished or absent; never exaggerated.

Eruptions.—Four of the seven had well-marked naso-labial herpes. In two of the remaining three death occurred almost too soon to allow of the eruption to appear, and one I did not see till towards the end of the illness. None of

the cases had herpetic eruptions in other parts, and none had the purpuric eruptions so common in the 1866-67 epidemic.

Eye.—Most of my cases had strabismus and double vision, always due to the external rectus being involved. In the four who have recovered, full control of the rectus has been regained. I have seen none of the purulent infiltration of the cornea, or of the ophthalmia which so seriously affected sight in 1867. When the fundus was examined there was always some involvement.

Urine.—Albumen was present in two cases, and in one there was complete absence of chlorides for a short time—a point of some interest on account of the connection supposed to exist with pneumonia.

Lumbar Puncture.—Professor Osler speaks very highly of this as a diagnostic agent.

Prognosis.—This depends very much on the epidemic; three of the seven cases died, and one is still in hospital. Dr. Grimshaw considered that children have a better chance than adults; at least many of the children admitted to Cork-street Fever Hospital under his care in the epidemic of 1866-67 recovered, while 80 per cent. of the young constabulary recruits sent to Steevens' Hospital, and also under his care, died.

Treatment.—I have applied ice to the head and evaporating lotions. Trional, bromides, and morphin have been used to relieve restlessness and procure sleep. Calomel has not been administered except as a purgative. The patients, when suffering pain in the trunk or extremities, have often expressed themselves as greatly relieved when rubbed with a chloroform and camphor liniment. If symptoms suggested a cardio-respiratory failure from pressure, I would resort to lumbar puncture with a view to diminishing the pressure by the removal of cerebro-spinal fluid.

Pathological Report by Dr. Littledale.

"Dr. Parsons gave me a syringeful of fluid which he had drawn off *post mortem* from the spinal canal of one of his cases. This fluid was very limpid and only slightly turbid, the turbidity being due to the presence of a few polymorphonuclear leucocytes in a degenerate condition—that is to say, their cell protoplasm was broken up and they had lost their circular shape. Cover-glass preparations were made from the fluid and stained with carbol fuchsin.

"These cover glasses showed the presence of diplococci composed of two hemispheres, with their flat surfaces in close apposition, so that with an intense stain like carbol fuchsin they may easily be mistaken for a single large coccus. They had no capsules as a rule, but what looked like a capsule was observed in two other cases. They were present in very small numbers, lying either inside the body of the polymorphonuclear leucocyte, or just as often free in the spinal fluid. Their size was very variable, being on an average the size of the gonococcus, but some of them were three or four times as large, while others were much smaller than the gonococcus. They stained feebly even with carbol fuchsin, and were absolutely decolorised by Gram, however long or intensely stained with the anilin-water violet.

"Preparations from Löffler's serum culture two days old showed a central blue granule in some of the cocci when stained with Neisser's acetic-methylene blue and Bismarck brown. No other organisms could be detected in these preparations, which were stained in several different ways.

"When the spinal fluid had been kept at 37° C. for twenty-four hours it showed a considerable increase of the organisms in the fluid. Cultures were made on the following media all under ærobic conditions :—

"1. Löffler's serum (horse serum, three parts; 2 per cent. glucose broth, one part); 2. Hydrocele fluid glucose broth, inspissated (hydrocele fluid, three parts; 2 per cent. glucose broth, one part); 3. Plain inspissated hydrocele fluid; 4. Horse serum agar; 5. Glycerine agar; 6. Ordinary agar; 7. Ascitic fluid agar; 8. Glucose agar; 9. Ordinary peptone broth; 10. Glucose broth; 11. Glucose formate broth; 12. Litmus milk; 13. Liquid horse serum; 14. Ordinary gelatine; 15. Glycerine gelatine; 16. Wort gelatine.

" Growths appeared on the first six media only and in the same order of intensity.

" *Löffler's Serum.*—The first cultures were made by simply squirting several drops of the spinal fluid from the syringe on to the sloped surface of Löffler's serum. These were put into the oven and kept at 37° C., but no sign of growth had appeared at the end of twenty-four hours. However, when examined again at the end of forty-eight hours, a copious growth was visible all along the line where the drop had run. All the inspissated serum used was perfectly white and opaque. The growth appeared as a glistening, confluent streak, quite colourless—that is to say, the same white colour as the medium. Its notable features were the very intense lustre and absolute confluence, no isolated colonies being visible. It was extremely viscid, and could only be removed with difficulty with a platinum needle, pulling out into a long mucus-like thread. When stained it proved to be a pure culture of the same organism as that found in the spinal fluid, agreeing in every way—the variability of size and absolutely negative reaction to Gram. When these cultures on Löffler's serum have passed through several stages of subculture they lose their viscidity almost entirely, and when such a growth has been several days in the oven it becomes a yellowish colour.

" *Hydrocele Fluid.*—On inspissated hydrocele fluid and Löffler's serum made with this, the growth was just the same, but more easily visible on the former, owing to the semi-translucency of the medium. There never was any liquefaction of the serum.

" *Glycerine Agar.*—Subcultures on sloped glycerine agar also gave a thick, confluent, shining growth at the bottom of the streak, tapering off at the top to a few small isolated colonies. These colonies were also of a glistening character, perfectly circular with an opaque centre, spreading out to a thin transparent margin.

" *Agar.*—On agar slopes the first attempts to grow the organism failed, but subsequently successful growths were obtained. It grew very feebly on agar, and even when a large quantity of a growth from Löffler's serum was smeared over the agar surface, two or three colonies similar to those on the glycerine agar were all that ever appeared.

" *Serum Agar.*—Serum agar plates gave a very luxuriant growth after twenty-four hours at 37° C. The colonies grew both superficially and in the depths of the medium. The surface colonies were precisely like the colonies described on the glycerine

agar, and showed a tendency to spread out over the surface with a translucent margin, otherwise they presented nothing characteristic. The deep colonies, however, were very characteristic. They were either round or lanceolate, looking with Leitz Obj. 3 and Oc. 3 as if composed of coarse granules, but the chief feature was the presence of numerous small buds on the parent colony, giving it sometimes a mulberry appearance, at others like barnacles on a stone.

"*Glycerine Agar*.—Glycerine agar plates failed on the first attempt, and subsequent plates only grew after forty-eight hours at 37° C. The colonies on these latter were precisely the same as those on the serum agar, but were much less numerous.

" *Other Media*.—No growth could be obtained on any of the other media kept at suitable temperatures.

" *Inoculations*.—Inoculations were made subdurally and into the spinal canal of rabbits by injecting a broth emulsion of a growth from Löffler's serum, but no lesions were found in the only animal that died, nor could the diplococcus be recovered from the seat of inoculation. Intraperitoneal inoculation of a mouse had no effect on the animal.

" Besides this case, I have assisted Dr. O'Sullivan in Trinity College laboratory in investigating some five or six others which gave results precisely the same as the above in every case.

" The same organism was always found and always quite pure, and there can be no doubt that it is the same organism as that described by Weichselbaum, who kindly sent us some cultures for comparison purposes, and more recently by Councilman, Mallory and Wright, and by Osler.

" Attempts to isolate the organism from the nasal secretion in several cases failed, and examination of stained preparations of the nasal secretion from infected and healthy persons only showed what looked like the diplococcus meningitidis in one of the infected cases. They were hemispherical cocci decolorised by Gram and not lying in the polymorphonuclear leucocytes, and were only found after a long search.

" It seems quite evident that the organism described has no relation to the diplococcus pneumoniæ, but it has a great similarity to the gonococcus in its shape, intracellular arrangement, and its growth on serum agar.

" There is considerable difficulty in keeping this organism alive, but it can be done by transplanting it on Löffler's serum every

three or four days, and keeping it constantly at 37° C.   Culture, on Löffler's serum kept at 37° C. were alive after fourteen days and grew on transplantation."

The following joint discussion took place on Dr. H. C. Drury's and Dr. A. R. Parsons' papers :—

Dr. Falkiner presented a table, showing the number of deaths in the Dublin Registration Area from all forms of meningitis in the years 1895–1900.   Taking the years 1895 to 1899 inclusive, the average number of deaths from all forms of meningitis, for the first 19 weeks of each year, was 102·6; but in 1900 the number of deaths in a corresponding period was 182·0, and the increase embraced ordinary meningitis, tubercular meningitis, cerebro-spinal meningitis, hydrocephalus, and secondary meningitis.   All forms of meningitis should be treated as zymotic diseases.   Sir Charles Cameron had adopted the proper course in making meningitis a notifiable disease.

Table showing the number of Deaths from " Cerebro-spinal Fever " registered in Ireland in each of the four Provinces during each of the 18 years 1881–1898, as given in the Registrar-General's Annual Reports.

| Year | DEATHS FROM CEREBRO-SPINAL FEVER | | | | |
| | PROVINCES | | | | |
	Leinster	Ulster	Munster	Connaught	All Ireland
1881	30	7	11	2	50
1882	21	15	12	3	51
1883	26	14	18	2	60
1884	39	15	20	7	81
1885	95	8	23	7	133
1886	60	13	26	8	107
1887	58	16	30	7	111
1888	29	12	23	13	77
1889	22	9	25	7	63
1890	23	8	19	1	51
1891	46	7	30	11	94
1892	17	6	21	8	52
1893	36	9	23	3	71
1894	21	4	27	4	56
1895	44	5	16	3	68
1896	47	10	16	3	·76
1897	48	2	24	2	76
1898	36	15	8	3	62

DUBLIN REGISTRATION AREA.

Table showing total Deaths from all forms of Meningitis for first nineteen
weeks of each year from 1895–1900, inclusive; also showing difference
between total deaths in 1900 and average of total deaths from 1895–99.

Year	Meningitis	Tubercular Meningitis	Cerebro-spinal Meningitis	Hydro-cephalus	Secondary Forms	Total
1895	51	30	3	10	4	98
1896	56	26	2	8	3	95
1897	54	30	7	7	9	107
1898	66	36	2	11	1	116
1899	44	43	2	3	5	97
1900	89	50	17	17	9	182

		Total, 1900	Excess
Average from all forms for 1895–99	... 102·6	182	79·4
Average from Meningitis ...	... 54·2	89	34·8
Average from Tubercular Meningitis	... 33·0	50	17·0
Average from Cerebro-spinal Meningitis	... 3·2	17	13·8
Average from Hydrocephalus ...	... 7·8	17	9·2
Average from Secondary Forms ...	... 4·4	9	4·6

Sir J. W. Moore remarked that that was the first occasion on
which meningitis had been made a notifiable disease.   He thought
Sir Charles Cameron's advice very judicious—namely, to require
notification for only four months.   He was struck with the coin-
cidence of the outbreak and the arrival in Dublin of the 21st Lancers
from Omdurman, where the disease had appeared in severe form
lately.   However, on inquiry he found that no case of cerebro-spinal
meningitis had occurred in the regiment before or since its arrival in
Dublin.   At the Meath Hospital they had had eleven cases, with
three deaths, and eight cases still under treatment.   This showed
that the mortality was not at all so high as in the epidemic of 1867.
The first case was a girl aged three, admitted on February 24th;
she recovered.   The second case was a girl aged sixteen, who came
in insensible and died quite suddenly within twenty-four hours of
admission.   In the third case, which also proved fatal, there were
evidences of lepto-meningitis.   The appearances brought to his
mind those observed in the 1867 epidemic.   On April 6th a girl
aged eight was admitted, and on the 9th of April her brother was
admitted, and they had at present a third child from the same
family under observation.   Taken with Dr. Parsons' cases, that was

most important as affording evidence of the infectiousness of the disease. On April 19th a grocer's assistant, aged twenty-two, was admitted. He is recovering after a very irregular and protracted fever. It was amongst this class of employés that some of the worst cases occurred in 1867. He thought that in adults moaning took the place of the hydrocephalic cry. In cases that recovered the emaciation was very great. He had noticed that albuminuria was very constantly present from the start. As to treatment, in the present epidemic he had found that the most successful measures were leeching behind the ear, and the repeated application of small blisters behind the ear. The agonising headache was relieved by a combination of acetanilide, caffeïn, and sodium bicarbonate. The present epidemic was very remarkable for the decubitus — the most marked opisthotonos being present. The epidemic of meningitis in 1866–1867 followed close on an epidemic of cholera, a fact on which great stress was laid at the time; but the discovery of the *Bacillus intracellularis* had removed the idea of any connection between the two. Both in the present and in the previous outbreaks in Dublin the disease was not confined to the city, but extended to Finglas, Rathmines, Kingstown, and other healthy suburbs.

Dr. Travers Smith said he had had fourteen cases of cerebro-spinal meningitis and two cases of a doubtful nature in the Hardwicke Hospital this year. Five other cases had been under the care of Dr. O'Carroll in the same hospital. The following were the points which would help him to make a diagnosis in future cases :—*Sudden onset*—This occurred for certain in nine of the fourteen cases; in three others no history could be obtained. *Severe pain in the head and vomiting*—The latter symptom present in nine on admission. The headache, which was subject to exacerbations, was more frequently frontal than occipital. *Retraction of head and rigidity of neck*, which gave pain on any attempt at flexion, was present early in eleven out of the fourteen cases. The *pulse* was slow, even while the *temperature* was rather high, in eight of the cases as early as the first week. *Loss of knee-jerk* was apparent even at time of admission to hospital in twelve of the cases; in one it was diminished, and in one exaggerated. *Conditions of the pupil*—Dilated, somewhat irregular, responding slowly to light in the majority of cases. Four of the cases showed actual changes in the optic disc. *Eruptions*—Eight of the fourteen cases had eruptions early. Those most common were an erythematous

eruption and herpes. The erythematous eruption was bright red, with very well-defined edges, felt very hot, and persisted for a good many days. It was most common on the neck, but in one case it appeared on the ankle and in another on the breast and down the arms to the elbow. The herpes appeared most commonly on the lips and neck. In two cases there were bullous eruptions on the feet. In only one case was there an approach to the classical description of purpuric spots. This patient died on the seventeenth day. On the day before death these spots appeared on front of chest, but they were not well marked. He had found the hydro-cephalic cry only in children. Later on in the disease a valuable sign was the irregular temperature, following no definite type. Emaciation was very rapid. Despite the fact that they got more food they wasted more rapidly than typhoid patients. Decubitus was also important. The stupor was not, he thought, easily to be mistaken for that seen in other fevers. There was a tendency to intermissions and exacerbations. In all his cases which showed this a rise in temperature was preceded by headache and vomiting. He agreed with Dr. Parsons that when these exacerbations occurred the temperature rose. In two cases he had seen hyperæsthesia of the skin of the neck. The subjective sensory symptoms were great pains in the back and down the spine, and in the legs as far as the knees. In some cases of rigidity of the neck only the deeper muscles were engaged, the trapezius being quite soft. He had not seen any great arching of the back. Of the fourteen cases nine were females. The duration was variable. One case, not yet quite well, had already lasted 77 days; one proved fatal on the 80th day, and one, which recovered, lasted 73 days. One patient died within a day and a half. Four of the fourteen cases died; two patients came from the same house. The only sequela was permanent deaf-ness in one case, and this without apparent otitis media. In two cases the patients, although recovered for some weeks, have involun-tary micturition at night. The prognosis as regards recovery was exceedingly difficult. Some of apparently the worst cases recovered, while, on the other hand, two had suddenly become comatose and died within an hour, one on the seventeenth, the other on the second day. All were under twenty years, except in the case of one woman, aged thirty-six, who died. Dr. Travers Smith showed clinical charts illustrating the highly irregular temperature.

Professor Bennett, speaking of the previous epidemic, in which he had seen many cases, chiefly under Sir John Banks, said the

diagnosis was easy because of the livid, patchy eruption. Some-
times petechial spots appeared on the first day of illness. The
symptoms were very much more severe than in the present
epidemic, and the prognosis was horribly bad. The general run of
deaths occurred in from 24 to 48 hours from the onset. If a
patient were alive after 48 hours he was likely to go on living for
a considerable time. Even if a patient recovered he was perma-
nently damaged—he either became blind or suffered from some
organic disease. He had seen only one patient who got so well
that he might be said to have completely recovered. He lived for
many years and obtained a high position, but he had not long occu-
pied it when he died insane. The *post-mortem* appearances were
exactly the same as in the present epidemic.

Dr. KNOTT said that in the 1867 epidemic he was always able to
diagnosticate the cases in the hospital wards by the hydrocephalic
cry alone. At the *post-mortem* he was struck with the peculiar
way in which the inflammation seemed to avoid the basilar mem-
brane ; the base of the brain was always free. The cervical cord
was always intensely inflamed, but in patches, not continuously.
In the 1867 epidemic the fatal result usually took place in about
three days.

Dr. CRAIG described the case of a boy, now under treatment,
who went to school one morning quite well, and got a severe head-
ache about twelve o'clock. He soon vomited, and became uncon-
scious at six o'clock. He was carried to the Meath Hospital at
nine o'clock, and was then sufficiently conscious to know when
anyone interfered with him. The most prominent of his symptoms
were :—An early development of conjunctivitis of the left eye,
which later on extended to the right eye ; internal strabismus of
left eye ; complete loss of conjunctival reflex. The eyes were fixed
towards the right side, as might be found in apoplexy or hemiplegia.
There was not much retraction of the head, and the limbs were
quite straight. The lateral decubitus which was present on admis-
sion had disappeared, and he now, three days after, had assumed
dorsal decubitus. He had not regained consciousness since admis-
sion, and was unable to swallow even a little water. There were
no purpuric spots present, although labial herpes had appeared. In
the case of a child, three years of age, which had recovered after
six weeks' illness, conjunctivitis, strabismus, and right-sided
paresis, with attacks of frenzy, had been the prominent features.
Blisters behind the ears and grey powder internally had been the
treatment adopted.

Dr. O'Sullivan described the *post-mortem* appearances of some of the cases. The fluid obtained by lumbar puncture was turbid but colourless. The pus in the spinal region lay in one case altogether outside the spinal dura, the cord being quite firm and apparently healthy. In the other cases it lay in the meshes of or underneath the pia mater, and the cord was softened. In the brain the pus was in all cases in or under the pia-arachnoid. The distribution of the pus on the surface of the brain was very symmetrical. In all cases the cerebro-spinal fluid was greatly increased in quantity, and was turbid, but not bloody or, to the naked eye, purulent. The Diplococcus intracellularis was found in the turbid fluid and in the pus, usually in pure culture. It grew best on Löffler's serum, but also on glycerine agar, and less actively on ordinary agar. On these media clear droplets first formed, which then coalesced to form a thick semi-transparent or yellowish opaque viscid layer. It lived longest on Löffler's serum, but even here sub-cultures taken five days after inoculation proved sterile. It grew well in the cerebro-spinal fluid itself. Plate cultures on blood agar (Wertheim's method) showed granular colonies yellowish brown in colour. The central part of the colony was made up of a heap of small spherical nodules exactly resembling those described by Wertheim as occurring in the colonies of the gonococcus. In the pus the organisms were seen in the pus cells usually in small numbers, diplococci with their adjacent surfaces flattened, varying a good deal in size and depth of staining. They did not stain by Gram's method. Inoculation experiments were unsuccessful.

Professor McWeeney said that the first case which had come under his notice was that of a school-girl, who was thought to have tubercular meningitis, and who died in the Mater Misericordiæ Hospital early in February. He was much struck by the presence of an accumulation of thick mucoid pus symmetrically placed in the posterior cornu of each lateral ventricle. Microscopic examination of the material at once revealed the intracellular diplococcus which he had never previously seen. In all the cases he had subsequently examined *post mortem* the same features recurred; occurrence of actual suppuration, the pus being very tough and mucoid; symmetrical disposition of the lesions on each side of the brain; distension of the lateral ventricles with turbid fluid; implication of the sides and back of the cord; and paucity of the intracellular cocci in the fibrinous exudation on the membranes. He had always

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found them more abundantly in the sediment obtained by centrifuging the ventricular fluid. He had not been so successful in cultivating the organism as Professor O'Sullivan. The unfavourable nature of the material was no doubt partly to blame. Even under favourable circumstances the organism was erratic in its behaviour, and he instanced one case in which Councilman, Mallory, and Wright had made 10 cultures from the meninges and six from the cord, and only obtained two growths from the former series and a single one from the latter, though slides made from the material used showed an abundance of the intracellular organisms. This led naturally to the discussion as to whether the inclusion in cells was the result of phagocytosis, and if so, whether Weichselbaum's organism was in reality only a form of Fraenkel's pneumococcus altered by having been subjected to phagocytism. In favour of the view that they had undergone phagocytosis were the facts that many of the organisms contained in the cells were undoubtedly dead, as shown by the experience of American observers and his own in trying to grow them; that many of the cases had a tendency to take on a relatively benign course; that when chronic cases succumbed it was often extremely difficult to detect any organism at all; and that the organism when inoculated on animals proved for the most part devoid of virulence, though some successful results had no doubt been obtained with goats. The remarkable, flattened shape of the meningococcus, and its decolorisation by Gram, were strongly against its identity with Fraenkel's organism; yet several observers of authority stated that it could be got to stain with Gram. As regards a capsule, the speaker demonstrated a preparation in which the intracellular cocci were contained in a distinct light area or "Hof," but this might perhaps be a "digestive vacuole." The same preparation which was made by the contact method from colonies obtained by inseminating the surface of a glycerine-agar plate with droplets of turbid ventricular fluid, showed the cocci growing out from their containing cells on to the surface of the medium, and thus proved them to be living, though included in the cell. The resemblance to the gonococcus in this, as well as in other respects, was very striking. A noteworthy point was the possibility of finding the meningococcus in the nasal mucus. In the very first case he attempted this, the intracellular cocci were at once found. He had, however, made no systematic or controlled investigations, and thought that inasmuch as Schiff had, out of a series of 27 non-

meningitic cases, found the organism in the nasal cavity of 7, this ready method of diagnosis could hardly replace lumbar puncture— the performance of which in all doubtful cases he considered very advisable.   In working with pure cultures of the organism, care should be exercised, for three German observers—Schiff, Scherer, and Kiefer—had all got severe rhinitis, and in the case of the last-named there was some stiffness of the neck as well.   This would seem to indicate a slight affection of the spinal meninges, and, if the observation were accurate, would serve to show that the path by which the infective matter enters the cranial cavity is through the nose—possibly through the cribriform plate.   The lymph-stream flowed the other way, but this was not of so much importance owing to the intracellular position of the parasite which might be carried in by the amœboid movements of the containing leucocyte.   In epidemics of cerebro-spinal meningitis the use of antiseptic nasal douches, and the disinfection of the nasal secretion and sputum, seemed to him important measures.   There was a disease of horses, known in Germany as Borna's disease, in which the essential lesion was a cerebro-spinal meningitis.   Intracellular cocci had been found in the pus, and it seemed quite possible that the disease might prove to be identical with human cerebro-spinal meningitis.   He had heard that numerous cases had lately been observed in horses about Dublin, and this was of interest in connection with the present epidemic amongst human beings.   (Prof. McWeeney showed a series of preparations illustrative of the morbid histology of cerebro-spinal meningitis.)

SECTION OF SURGERY.

PRESIDENTIAL ADDRESS.

By R. L. SWAN, P.R.C.S.;
Surgeon to the Dublin Orthopædic Hospital.
Surgeon to Steevens' Hospital;

[Delivered in the Section of Surgery, November 10, 1899.]

IT may not be thought out of place at this time, when the
subject of the prevention and treatment of syphilis in the
Army and Navy has been recently under discussion, to make
a few observations on this subject, so important to the
community at large, as well as to our soldiers and sailors.
I shall not enter on the question of the prevention of
syphilis by legislative means. Almost all persons who
are competent to form opinions unbiassed by side issues
have offered those opinions to successive Governments in
this country.

The classification of venereal diseases into gonorrhœa,
the chancroid or soft sore, and the Hunterian chancre, or
true syphilis, is, I believe, unalterable. They have nothing
in common, unless the locality. Gonorrhœa is a local dis-
ease attacking the mucous membrane, and specific in the
fact of its having a special microbe. It is true that there
are occasional instances of systemic infection, evidenced by
so-called gonorrhœal rheumatism, by internal ophthalmic
lesions, not produced by contagion, and by eruptions on the
skin. In those exceptional instances there may be an
infective process. In the chancroid, likewise, a circum-
scribed infective process may occur, as in the production of
the ordinary chancroidal bubo. True syphilis has its
importance and essence in its being always an infective

disease, the organisms passing into the general circulation, and existing and multiplying in favourable situations.

How is it, then, that a lesion presenting at first all the features of a soft sore may in time alter its character, and be followed by some or all the sequelæ of true syphilis? Many surgeons of distinction consider the poisons of chancroid and true syphilis to be identical. I believe the patient in all such cases to have received a double inoculation; that the chancroid has furnished a favourable culture-medium for the syphilitic microbe, and perhaps even hastened its period of incubation, which under average circumstances is from three to four weeks.

Let us examine the usual progress of a soft sore. It commences as a papule, which at the end of the second or third day (depending on the delicacy of the skin involved) becomes a pustule. This soon bursts, and at the end of the first week a deep, suppurating sore is found, which increases in circumference and depth, and secretes pus abundantly. In the soft sore are found all the phenomena of inflammation, but no induration or thickening of its base. There is a tendency to a progressive destructive involvement of surrounding tissues. The pus is inoculable on the patient himself—on either the mucous membrane or skin; so that from want of cleanliness or care the sore is often multiple. Chancroids may be treated as are other unhealthy wounds. I have myself a routine, based upon the application of germicidal or antiseptic agents. Other surgeons have their methods. The chancroid sometimes tardily takes on, at length, healing action, and gets well like any other ulcer, and is followed by no constitutional effects. Frequently, as before stated, the lymphatics in the inguinal region become enlarged, and after a time suppurate, leaving perhaps troublesome sinuses, which lead to an indurated mass of inflamed tissue. In passing, I may say that I have

found the best practice, in the case of chancroidal bubo in any stage, is to cut down on the swollen tissues, remove them with a sharp curette, thoroughly cleanse the parts, and sew up the skin wound. It usually heals at once, and no further trouble is experienced.

Not rarely, however, as time goes on, the sore assumes a new appearance, the surface ceases to secrete pus, it becomes glazed, and the base hard and cartilaginous. Still later the throat becomes ulcerated, skin eruptions appear, and the existence of true syphilis is disclosed. Here, then, is the argument of those who maintain the identity of the poisons. It is, I believe, as I have stated before, a double inoculation, and the change and evolution of the simple chancroid is explained by the latency of the microbe of true syphilis and its more extended period of incubation.

Sometimes a soft sore, from intense inflammatory action, produces a rapid and destructive tissue necrosis, known as phagedæna. This event appears to show an intermission and recrudescence in type, like other diseases which vary in the intensity of their local inflammatory lesions—for example, we see scarlatina maligna and measles of a virulent form. When I was House Surgeon at Steevens' Hospital, thirty years ago, phagedæna was one of the commonest occurrences ; for many years it was infrequent, lately it has not been uncommon. It was supposed that it occurred invariably in persons of broken-down constitutions. This is not so ; I have seen it in many persons of good general health and vitality. I believe that the true explanation is this : That, as persons in civilised communities become immunised to a degree by a remote or recent inoculation by the microbes of the diseases of civilisation, persons showing no powers of resistance have either escaped the immunising taint or it has become attenuated and lost.

The Genesis and Progress of the True Syphilitic Sore.—It always appears at the site of inoculation at a period varying from ten days to six weeks. Where lurks the virus during this long period? All the evidence shows that it must remain in the habitat of the inoculation. If, as some have supposed, the Hunterian chancre is secondary to a constitutional infection, it would be reasonable to expect that during the two months other characteristic lesions would be seen elsewhere. This opens up the question whether syphilis can be aborted by the excision of the chancre. But the infiltration and enlargement of neighbouring lymphatic glands appear to be almost synchronous with the induration of the sore, and while there is a great difference of opinion as to the value of the treatment it seems reasonable that if seen early the virus may be removed at once. Further investigations in this direction would be valuable.

It may commence as an erosion, a papule, or less frequently an ulcer, ten days or more after exposure. Ulceration, if it exists, which is not invariable, is unaccompanied by the profuse secretion of pus which distinguishes a soft sore. The essential induration is produced by a sclerosis of the small blood-vessels and a preservation and infiltration of the fasciculi of the connective tissue. It occurs at the end of the first week from the appearance of the sore. There are varieties, but the most common chancre is a small cell-like depression on an elevated and hardened base. The induration varies remarkably in different tissues.

The enlargement of the lymphatic glands in true syphilis is progressive, but always begins in those nearest the inoculation. About six weeks is occupied in the involvement of all the visible lymphatics. For diagnostic purposes, if necessary, the multiple induration of the posterior cervical glands is especially valuable.

The Treatment of Syphilis.—The excision of primary lesions has been alluded to. It remains to consider the treatment of syphilis by medicine. Almost from the earliest records of the disease mercury has as a remedy enjoyed a position which it still holds. No doubt, in former times abuse of the drug was usual, and manifestations of mercurial poisoning were common. After the Peninsular war Aix-la-Chapelle obtained notoriety for the relief of those ailments. It has ever since been frequented by syphilitics. Steevens' Hospital was endowed in the earlier years of this century for the maintenance of beds for the treatment of syphilis, and in No. 2 Ward were made the observations of Abraham Colles, from which were evolved the description he gave of secondary suppurating lesions, the advantages of mercurial fumigation, his celebrated law of immunity, and the true nature and accompanying signs of the lymphatic swelling known in every country as Colles' constitutional bubo. Wallace also—at that time surgeon to Jervis-street Hospital—was a frequent visitor and observer.

The records of treatment furnish curious information regarding the administration of mercury. It seems to have been considered that its benefits were derived from its action as a sialogogue. When I first went there as a student there were certain pewter cups capable of holding about a quart. The mercury was said to have been persevered with in former years till one, two, or three of these cups were filled by the patient in the day. In spite, however, of changes of thought resulting from its abuse, there is no remedy to equal mercury in the treatment, at least, of primary syphilis. It should be given at the very earliest period a diagnosis is made, and the system should be kept persistently, although slightly, under its influence for a lengthened period. The great difficulty in the treatment

of syphilis is the length of time required to combat the periodic manifestations of the toxins. This difficulty has been to some extent met by the method of intra-muscular injection of mercurial cream of Major Lambkin. The injection is administered once a week, and the dosage is maintained by slow absorption. I have administered it on numerous occasions, both in hospital and in private, without any but the most trifling inconvenience to the patient. While fully alive to the value of iodide of potassium in the absorption of the neoplasms of advanced syphilis, I do not think it can ever take the place of mercury in its early treatment. The words of Wallace, who introduced it, are : " He was not going to dispossess mercury of its well-earned high rank in the treatment of syphilis, but that we had in iodide of potassium a remedy completing our circle of therapeutics." A few words in allusion to two varieties of the disease—I should rather describe them as types—occurring in individuals completely unprotected by influences which confer partial immunity. One, malignant syphilis; the second, where tertiary symptoms appear at an early period of systemic infection—*syphilis tertiare précoce.* I will briefly illustrate them by two cases. A woman, aged forty-five, the mother of seven children, was admitted into No. 9 Ward, Steevens' Hospital. The history was unreliable. There was on admission a rupial ulcer on the back of the forearm. On close examination I found a small induration at the cleft between the thumb and index finger. Within a fortnight throat and nasal symptoms were advanced ; all the accessible lymphatics were found to be enlarged and indurated ; a node developed on the frontal bone, followed by rapid destruction of the soft parts; almost the entire frontal bone exfoliated. Dr. Donnelly saw the case at my request. Rapid cachexia supervened, and she died from exhaustion.

Syphilis Tertiare Précoce.—A man, aged twenty-eight, at present in No. 2 Ward, was admitted with a hard sore on the glands.   Within a fortnight he was covered with rupia.   I have never seen such an example.   He looked as if limpet-shells were pasted on to every available portion of skin. His appearance was remarkable, and he served as a moral and warning to careless youth.   He became very cachectic. The usual anti-syphilitic remedies were used.   Mercury, the iodides, and a combination of both, were given without avail.   At last I ordered him the tabloids of thyroid extract, and like a charm his sores were healed.   He grew fat and strong, and is now practically well.   The original sore is still indurated.   I have no explanation to offer as to the result in this case.

URINARY INFILTRATION.

By HENRY GRAY CROLY, F.R.C.S.;

Past President Royal College of Surgeons;
Senior Surgeon Royal City of Dublin Hospital.

THE subject of my communication this evening is one of great importance—the cases are always most serious, and tax the knowledge, skill, and courage of the surgeon, whose motto should be *Semper paratus.* When House-Surgeon in the Hospital—to which I have ever since had the honour and great advantage of being Visiting Surgeon—I was allowed, through the kindness of my late teacher, colleague and friend, Mr. Tufnell, to read a paper at the old Surgical Society on a case of " Lacerated Urinary Bladder," admitted during his accident week. I exhibited the recent specimen of fractured pubes, caused by a dray-wheel passing over the man's body. In that communication I adopted the terms *rupture* when caused by disease, and *laceration* when caused by violence from without.

In my clinical teaching I have applied these terms—viz., ruptured and lacerated urethra—as causes of urinary infiltration. Urinary extravasation, or infiltration, is one of the most serious affections which a surgeon is called upon to treat, and though the symptoms usually present should admit of an accurate diagnosis, cases are not infrequently overlooked, valuable time lost, and lives risked by the unnecessary delay in adopting active treatment.

It has fallen to my lot to meet with a large number of such cases in my hospital and private practice. The beautiful

original drawings of some of my cases, taken in the hospital theatre by my friend and former resident pupil, Mr. (now Dr.) Paul Carton, show the appearance in the various stages. It is a rather remarkable fact that in no surgical work have I ever seen a drawing illustrating this affection. I have found these drawings of much value in my clinical teaching, and I am sure they will be examined with much interest by the members of this Section of the Royal Academy of Medicine.

A short reference to the surgical anatomy of the perineum will doubtless prove interesting and instructive to many who may not have time or opportunities for refreshing themselves in anatomy.

The portion of the urethra which gives way through ulceration is, most frequently, the vicinity of the bulb. The rupture usually takes place anterior to the triangular ligament, and under cover of the strong fascia known as Colles' middle perineal fascia, which is attached at the sides to the rami of pubes and ischia, and being reflected posteriorly joins the anterior layer of the triangular or interosseous ligament. The urine, which escapes through rupture or laceration in the vicinity of the bulb, or in the spongy urethra, makes its way anteriorly––the only way of escape—and quickly reaches the scrotum and perineum, and extends along the track of the cord and lower part of the abdomen, sometimes ascending to the umbilicus and occasionally as high as the axilla. When the extravasation occurs in a case of old-standing stricture, the practitioner is prepared more or less for this serious complication ; but when the infiltration occurs in con-nection with perineal abscess the symptoms are not always so well marked or easily recognised.

In traumatic cases the attention of the surgeon is brought directly to bear on the case. When the infiltration occurs deeper than the triangular ligament the symptoms are by

no means well marked, and fatal symptoms and signs may be the earliest indications. The usual scrotal, penile and perineal signs may be absent; ischio-rectal sloughing and a gangrenous patch on the glans penis, with great depression, delirium, hiccough, and failing pulse, are forewarnings of impending dissolution.

Mode of Production of Infiltration of Urine.—When the bladder is distended the abdominal muscles force the urine through the ruptured or lacerated urethra into the cellular membrane. The scrotum, penis, the perineum, and the groins are distended with urine. The first effect is relief to the patient's sufferings. There is no more straining, and the spasm of the stricture, no longer excited by pressure from behind, becomes relaxed. After this deceptive interval of ease another order of symptoms shows itself. The urine, in consequence of its long detention in the bladder, becomes altered. Its watery parts have been absorbed, it is in consequence saturated with salines, and its stimulating properties increased. Wherever this fluid penetrates it first excites inflammation and then kills the parts with which it is in contact.

Causes of Urinary Infiltration.—Extravasation of urine may be of traumatic origin, following direct injury to the perineum by falling astride on a joist of timber on a scaffolding, or by the kick of a horse whilst being shod, or, as in one of my cases, by a kick of a man's shoe from behind whilst patient was in the stooping posture. The severe hæmorrhage from the urethra which immediately follows such injuries, naturally assists the surgeon in his diagnosis, and he is on the look-out for symptoms of infiltration. Assuming the patient to be in sound health the urine is much less irritating than in cases of old standing strictures, and consequently the local mischief and constitutional disturbance are much milder.

In old-standing permanent strictures important changes take place behind the stricture—ulcerative changes caused possibly by careless catheterism, perineal abscess, the urethra ruptures at its *weakest point*, and produces extravasation of urine in its most unhealthy form.

In Brodie's time the anatomical site of permanent stricture was referred—by that distinguished surgeon—to the membrano-bulbous portion of the canal. In other words, behind the bulb; but modern surgeons, notably Sir Henry Thompson, have proved by careful investigation and examination of the specimens in museums that the bulbo-spongy urethra—in front of the anterior layer of the triangular ligament—is the most frequent seat of the disease. It therefore follows that in cases of infiltration, caused by the bursting of old-standing strictures, the urine escapes anterior to the triangular or interosseous ligament, and beneath the middle perineal fascia of Colles. The attachment of this important structure, to which I have referred, at each side to the ischium and pubes, and posteriorly to the base of the triangular ligament, prevents the urine passing backwards or laterally, and leaves an easy escape forwards and upwards into the perineum, scrotum, penis, track of the spermatic cord, and lower part of abdomen, occasionally passing backwards towards the lumbar region, and rising as high as the umbilicus, or even to the axillæ. In such extreme cases the surgeon's sound anatomical knowledge, courage and promptitude, are all requisite to rescue his patient.

The *sudden* swelling in the perineum, the œdematous scrotum and penis following on injury, or on the act of straining to pass water in retention caused by stricture, point to this truly formidable affection, and no time should be lost in dealing with the case. When the urine escapes insidiously into the sac of a perineal abscess the surgeon

may be thrown off his guard; the symptoms, however, soon become apparent. In those cases where the laceration or rupture occurs between the layers of the triangular ligament or posterior to it, the visible signs may be absent, the urine makes its way round the neck of the bladder into the ischio-rectal fossæ, and occasionally into the corpus cavernosum. Destructive inflammation is thus set up out of reach of the surgeon's knife, and a train of symptoms sets in pointing to destruction of tissues and loss of life. A black spot on the glans penis is considered by all surgical authorities as a fatal sign.

The recto-vesical layers of the pelvic fascia forms the line of demarcation between the perineum and the abdominal viscera through the space between the bladder and the other parietes of the pelvis, and affords resistance to the progress upwards of effusions from below. This structure may be considered as a shelving roof to the perineum and a concave floor to the abdomen. Urine effused *above* the level of this fascia must soon reach the peritoneum and produce the most disastrous consequences.

In the treatment of urinary extravasation three main objects must be kept in view—viz.: (1.) To prevent further escape of urine into the areolar tissues. (2.) To give free vent to that already extravasated. (3.) To combat fever, to support strength, and to carry out Listerism in dealing with the parts involved.

The symptoms usually present in cases of infiltration anterior to the triangular ligament are absent; in fact the patient might succumb without the practitioner called in being aware that he had so serious a case to deal with. The scrotum, penis or perineum are rarely affected. The history of the case, however, should enable an experienced surgeon to make a diagnosis. The patient having suffered long from a stricture which necessitated prolonged straining,

and following a sudden effort to empty the bladder, a sensation of temporary relief, with no outward appearance of urine or hypogastric tenderness, and rapidly setting in of low fever, especially if any perineal swelling follows, should settle the case. If that black spot on the glans penis caused by infiltration into the corpus cavernosum, is observed, the diagnosis and prognosis may be considered as settled. Gangrene usually sets in, preceded by a green-leaf appearance, in cases of infiltration within a few hours—it may occur earlier; a great deal depends on the character of the urine.

Urinary infiltration from so-called false passages and clumsy catheterism is rare; if the latter were a cause infiltrations would be common, as no operation in surgery is so frequently undertaken by those who know almost nothing of the anatomy of the parts with which they deal so flippantly.

When extravasation occurs between the *orifice* of the urethra and the *bulb* the swelling is usually confined to the *penis*—these cases are not, in my experience, common; if between the *scrotum* and front of the *bulb*, Colles' middle perineal fascia, as I have described, limits the effusion—these cases are the most frequent. If the rupture occurs in the membranous portion of the urethra, the infiltration will be hemmed in between the layers of the triangular or Camper's interosseous ligament, and can only escape when suppuration and sloughing occurs. In deep-seated ruptures *behind* the *triangular ligament* (which are fortunately rare), the urine usually follows the course of the rectum and may point near the anus; and if it bursts through the pelvic fascia at its thinnest part the urine may enter the peritoneum.

Gangrenous erysipelas of scrotum, following on "acute anasarca," or inflammatory œdema of the scrotum of Liston, might easily be confounded with infiltration under certain circumstances. Here, again, experience comes to the rescue.

The extent of extravasation and subsequent sloughing will depend upon—(a) The force with which the urine is injected; (b) the quality of the urine ; (c) the distension of the cells of the areolar tissue.

In bad cases, rigors, vomiting, low fever (typhoid), rapid small pulse, dry brown tongue, hurried respiration, anxiety, restlessness, and red lines along the inguinal canal, are indicative of infection.

In extreme cases the pulse rises above 140, and becomes intermittent, the abdomen distended and tympanitic, hiccough, sordes on teeth, jaundiced skin, cold, clammy sweats, subsultus tendinum, black spot on the glans penis, Hippocratic face, delirium and coma (urinary apoplexy), are signs of dissolution.

Differential diagnosis between urinary infiltration and gangrenous erysipelas of the scrotum :—

Urinary Infiltration.	*Erysipelatous Scrotum.*
History of stricture or injury.	No stricture history.
Swelling sets in at once in scrotum.	Urine can be expelled in ordinary way.
Perineal swelling usually hard.	Large catheter can be passed.
No urine passed in natural way.	Redness *precedes* swelling of scrotum.
The characteristic urinary odour.	*No perineal swelling.*
	Absence of urinary odour.
	Constitutional symptoms not usually so urgent.

Points in common : Swollen scrotum, purple-coloured phlyctenulæ, red lines along groin, low fever, restlessness, rigors, penis swollen. The treatment is the same as regards the *scrotal* tumour—viz., free incisions. Mistaking urinary infiltration for gangrenous erysipelas would be very serious, as the deep *perineal* incision, so very important in the *extravasation*, is not at all needed in erysipelas cases.

In the treatment of urinary extravasation place the patient on a table in the lithotomy position ; pass a Syme,

Wheelhouse, or an ordinary catheter very carefully to the rupture, or without any such guide make a *deep*, long central incision into the perineum from behind forwards—a finger in the rectum is a safe procedure; if a full-sized silver catheter can be passed into the bladder tie it in. I leave it in for a fortnight, washing it thoroughly several times a day, by means of a suitable syringe, with warm boric lotion. Then make at least two deep, long incisions, not scarifications, into the scrotum, plug them at once with strips of cyanide gauze saturated with turpentine to arrest hæmorrhage; *do not plunge the knife for fear of injury to the testes;* make incisions into the penis also, and if there is redness or swelling along the track of the spermatic cord follow such lines with the scalpel, also on the abdomen or wherever any signs exist of infiltrated urine. These incisions must (to be of real value) be made promptly and courageously—no temporising. The subsequent dressings, two or three times a day, tax the time and the skill of those who are entrusted with such cases. The use of the antiseptic spray near the bed I find most healthful for the ward and its inmates.

I have been much struck with the rapid improvement, locally and constitutionally, in these very severe and dangerous cases. The surgeon, house-surgeon, resident pupil and dressers are amply rewarded by the splendid results attained. I have but *one* death to record in a large and long experience of cases of urinary infiltration.

In some of my cases the testes were laid bare, the groins showing deep channels, the abdomen and loins deeply excavated, healthy granulations formed, and the original wounds healed. Plenty of fresh air, good nutritious food, tonics, and sedatives—all aid in perfect restoration to health. By keeping a catheter in for some weeks after the operation, in the way I have described, the patient passes water in a full stream and requires no further use of the instrument.

PLATE I.— Mr. Henry Gray Croly on Urinary Infiltration.

Falconer, Dublin.]

P. CARTON.

PLATE II.—Mr. Henry Gray Croly on Urinary Infiltration.

P.CARTON

PLATE III.—Mr. Henry Gray Croly on Urinary Infiltration.

P. CARTON

Falconer, Dublin.]

PLATE IV.—Mr. Henry Gray Croly on Urinary Infiltration.

Falconer, Dublin.
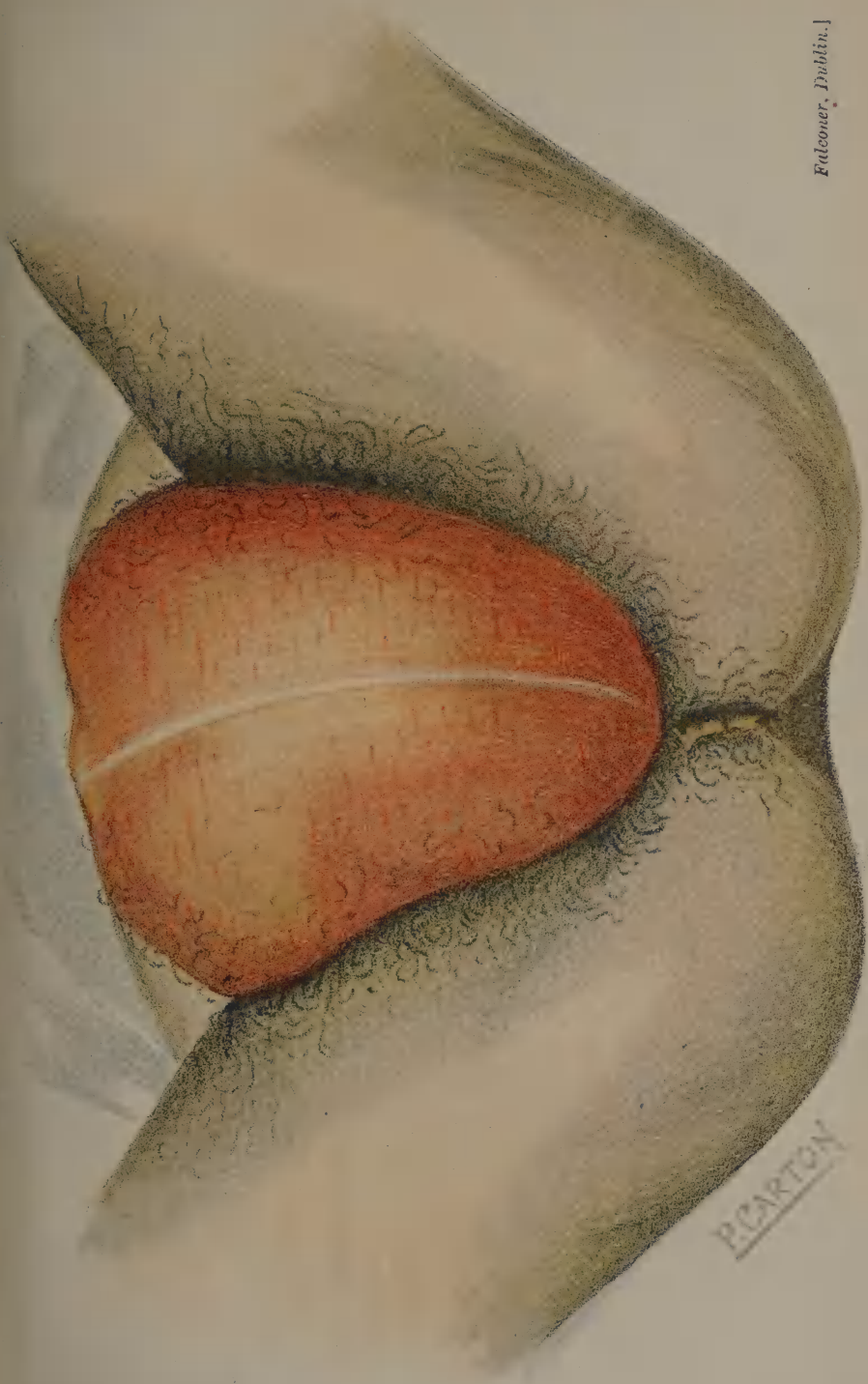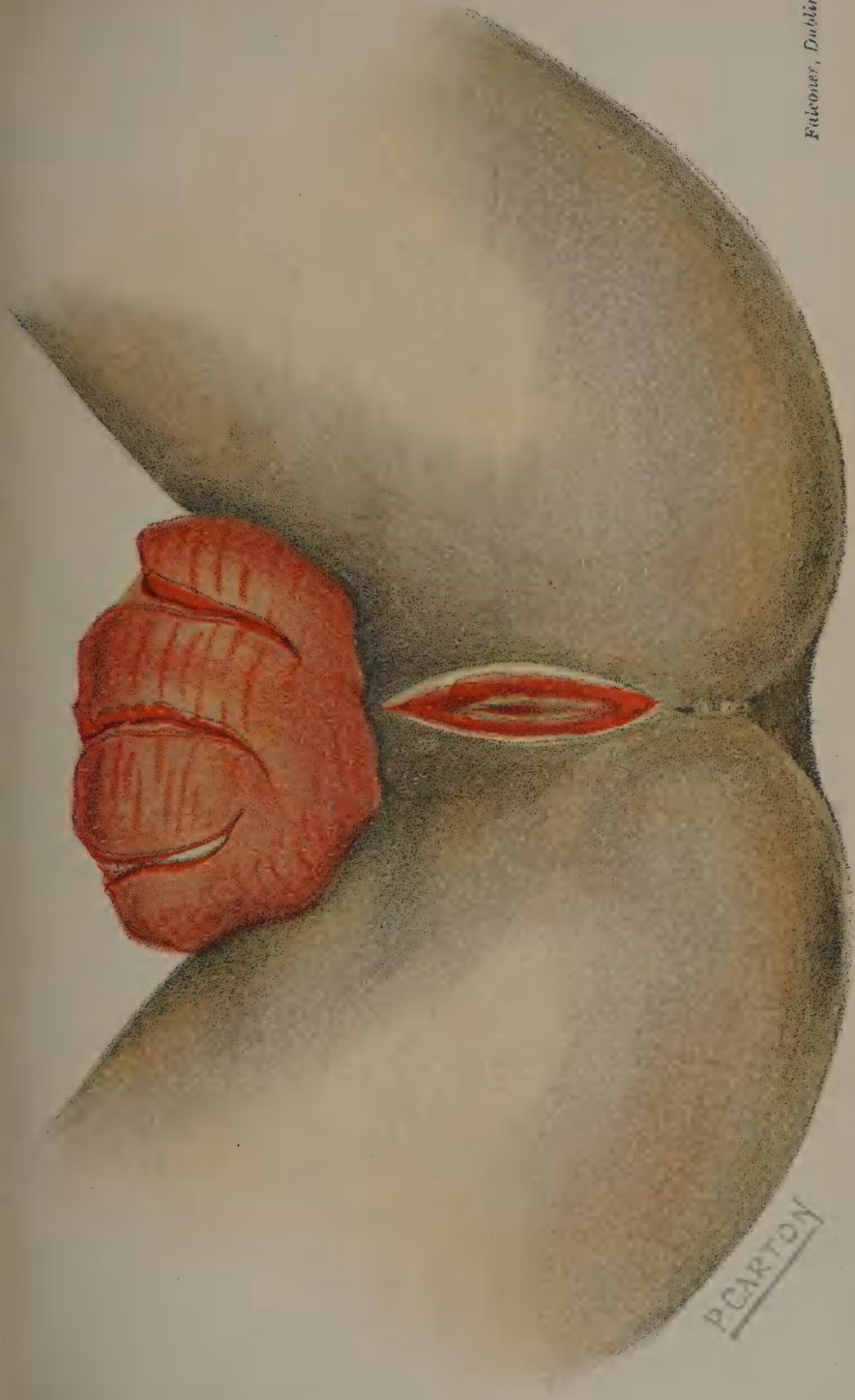
PLATE V.—Mr. Henry Gray Croly on Urinary Infiltration.
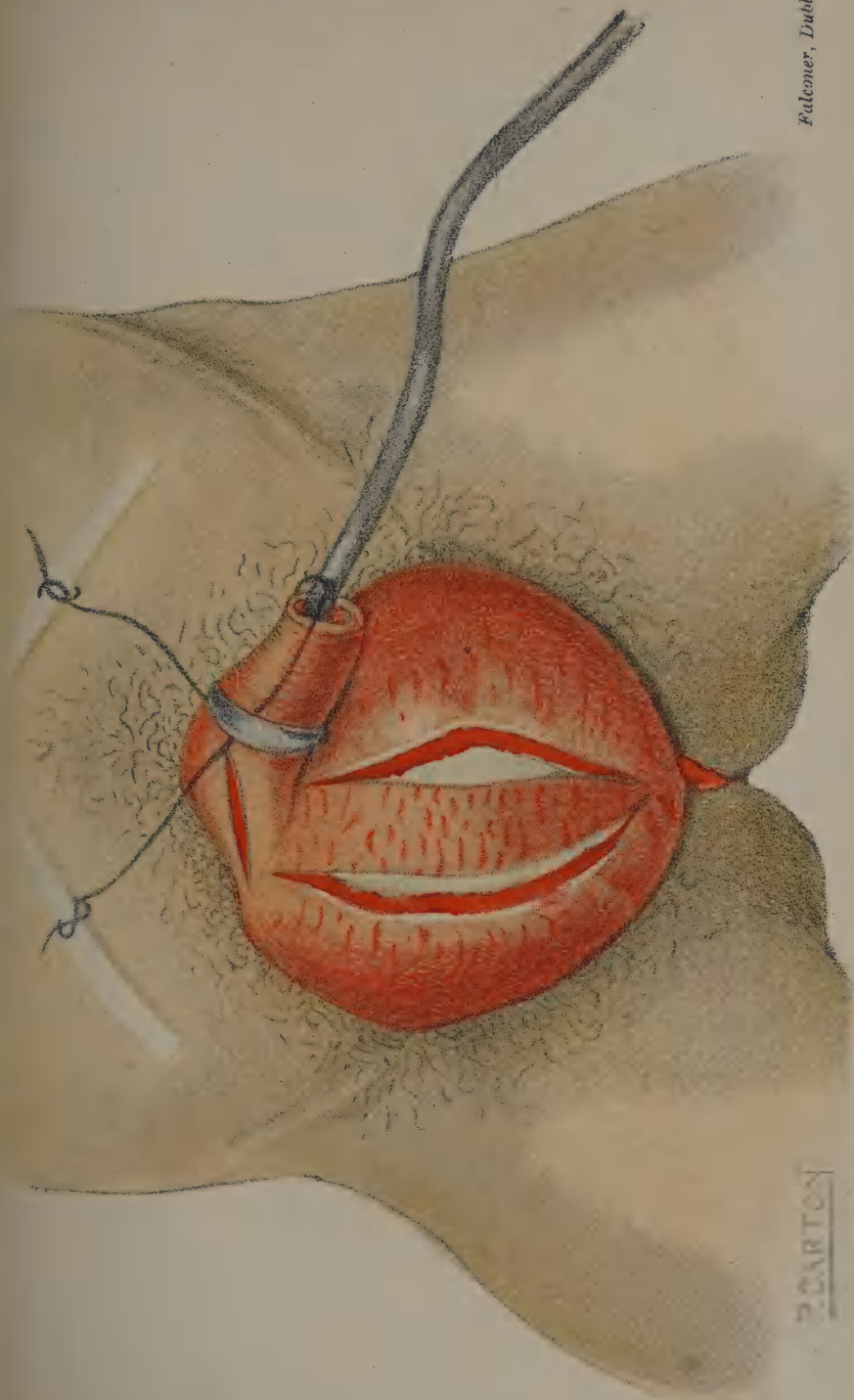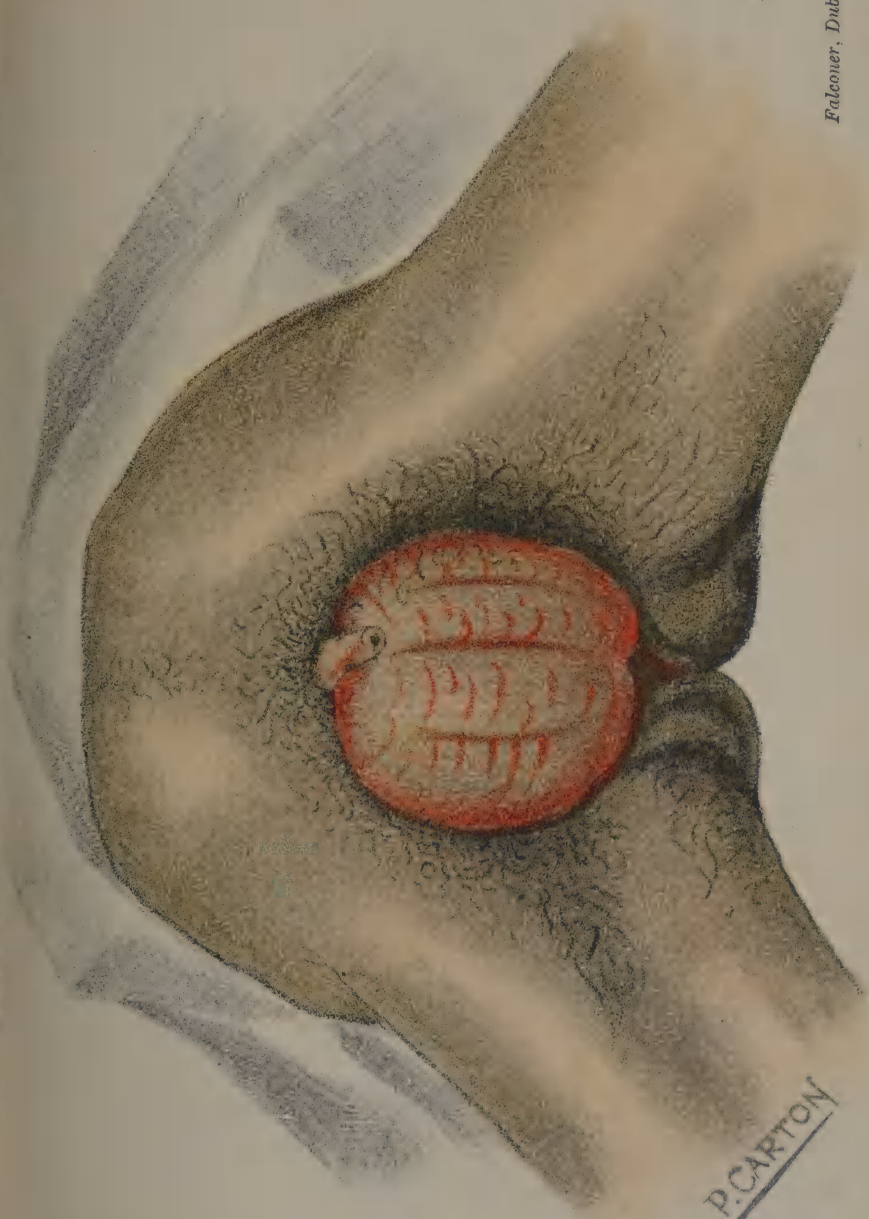
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Falconer, Dublin.

PLATE VI.—Mr. Henry Gray Croly on Urinary Infiltration.

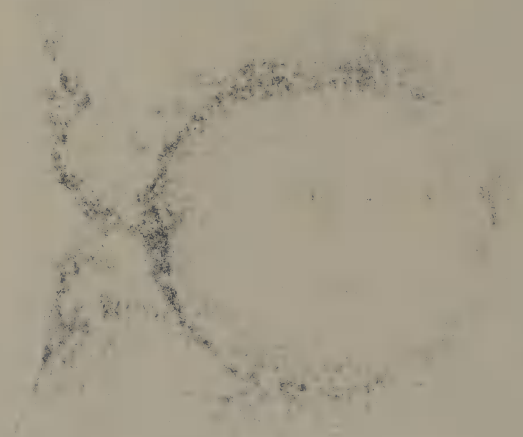PLATE VII.—Mr. Henry Gray Croly on Erysipelas of Penis and Scrotum.
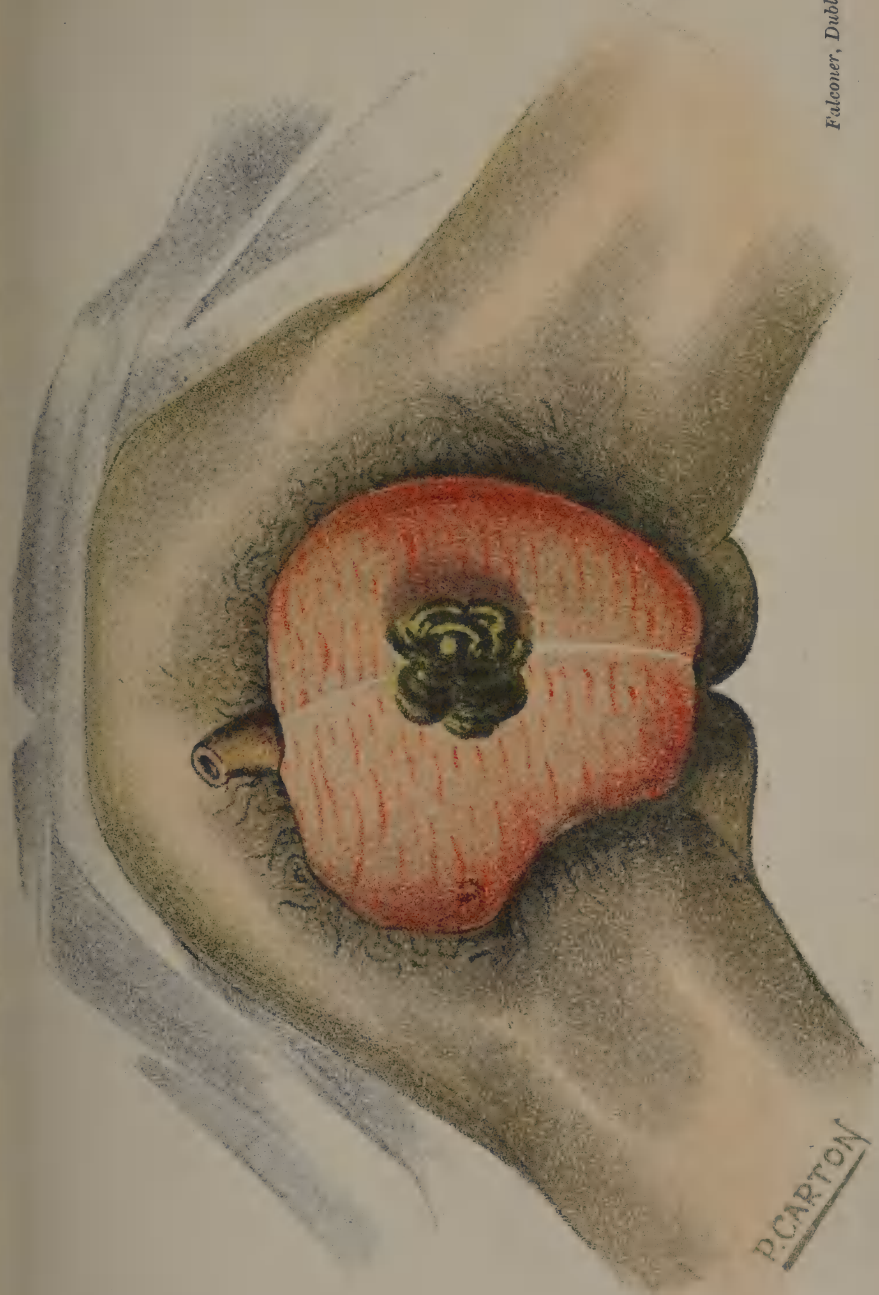
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PLATE VIII.
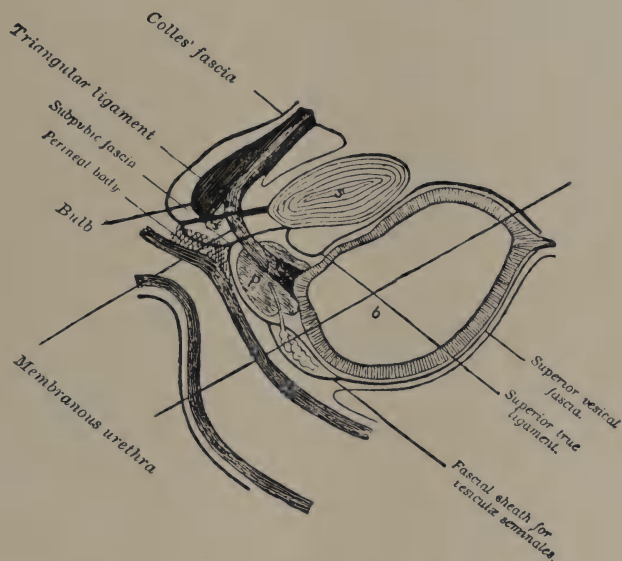
The Fascia of the Urethra, Prostate, and Bladder: *r*, rectum;
s, symphysis pubis; *b*, bladder; *p*, prostate.

(*Macalister.*)

The following cases are selected out of a large number from my note-books : —

CASE I.—I was summoned in consultation with my late father, on a Christmas Eve, to see Mr. ——, aged fifty, residing beyond Rathfarnham.   The patient suffered for years from organic stricture, and had instruments passed by a surgeon in the city from time to time.   On returning home the day my father was called on to attend, the patient got retention and used considerable force endeavouring to empty his bladder, only a few drops of urine escaping.   The patient was alarmed at seeing the scrotum becoming enlarged, and when I arrived I found the scrotum, penis, and perineum presenting all the signs of extensive urinary infiltration. After a short consultation we decided to operate at once.   Chloroform having been administered, I made a free and deep incision in the central line of the perineum ; I incised the scrotum also. Carbolic acid—which had just come into use at the time—I applied very strong.   The result was remarkable—the wounds cleaned quickly and the patient made an excellent and quick recovery.

CASE II.—Shortly after above case occurred I was sent for to visit Mr. ——, who stated that he suffered from organic stricture for years. He was seized with retention, and was in the act of straining when I arrived.   Seeing the scrotum swollen I lost no time in making free incisions in the mesial line and scrotum.   The patient made a good recovery.

CASE III.—Mr. ——, aged fifty-five years, was attended by a practitioner for some weeks, and had instruments introduced.   Infiltration to an enormous extent occurred.   The medical attendant in charge of the patient punctured the scrotum with a trocar and became alarmed when he got no fluid.   When I saw this gentleman his condition was most alarming.   My friend and former pupil Dr. (now Lieut.-Colonel) Charleton, R.A.M.C., P.M.O., Netley Hospital, who was stationed at Beggar's-bush Barracks, assisted me in the operation, which required the most extensive incisions I was ever called upon to make.   Notwithstanding the free use of carbolic dressings, changed frequently, there was much sloughing and fœtor.   The testes were laid bare.   The inguinal canals and abdomen were involved ; the sloughing extended to axillæ.   This case ultimately made a good recovery.

Some of the hospital cases which came under my care are well shown in the valuable original drawings taken by my former pupil, Mr. Paul Carton (now Dr. Carton, Assistant Master Rotunda Hospital).

CASE IV. ——, tailor by occupation, aged fifty-five years. Suffered from organic stricture of urethra for years. Presented himself at the hospital at my morning visit. Refused admission, though I urged him to stay in. He returned in three days in the most dreadful condition—scrotum, penis, perineum, abdomen, and loins showing signs of gangrenous infiltration. Skin jaundiced; pulse weak and intermittent; breathing oppressed. Notwithstanding the most energetic treatment, operative and otherwise, the sufferer succumbed.

This was the only case of infiltration which terminated unfavourably in my practice.

CASE V.—C. P., aged thirty-seven; completed army service twelve years. Brought a distance of three miles in a cab to hospital, January 21st, 1897. States he had been suffering from stricture for over five years; was in great pain, bladder distended; instrument could not be passed; bladder tapped, suprapubic; 20 ounces of urine drained off. 22nd.—Bladder again tapped, 18 ounces of urine drawn off. 23rd.—Infiltration occurred suddenly, as I was in the ward. Operated on at once. I was assisted at the operation by my brother, Surgeon-Lieut.-Col. Arthur England Johnson Croly, F.R.C.S., R.A.M.C. (now on Lord Northcote's staff at Bombay). Two impermeable strictures were divided and incisions made at each side of the scrotum; incisions above pubes. No. 10 catheter was passed and tied in; boric lotion used frequently with syringe. 24th.—Temperature never rose a degree. March 17th.— Wound in perineum quite healed; passes urine in a large stream. April 23rd.—Sent to Convalescent Home.

The above was a wretched, wasted man, pale and anæmic from continuous suffering. He was employed on fatigue duty, and neglected to report himself sick fearing he would lose his post. This man was a great sufferer for years. Urine dribbled, wetting his clothes constantly. The catheter was kept in for over three weeks from the time of the operation with

the very best result. One day, before the patient left hospital, in passing water he "hit a screen" some feet off, and laughed so heartily that his comrades in the ward were surprised and amused, the patient having been previously very silent and much depressed in consequence of his miserable condition.

Mr. R. B. M'Causland asked if Mr. Croly thought incision of the testicle in these cases would be dangerous. He thought it remarkable that so many patients recover from injuries of this kind.

Dr. E. H. Bennett had seen a case where a man was " butted " in the belly, and injury to the bladder was supposed to have resulted. A catheter was passed, and bloody urine drawn off, but the patient objected to the passing of the instrument, and afterwards passed water for himself. He lived for nearly two months, and died, not with urinary symptoms, but of obstruction to the rectum. At the *post-mortem* urinary extravasation into the pelvis was found, although there were no external phenomena to indicate this.

Mr. Doyle had seen extravasation of urine in a boy four years old who had fallen out of bed, causing injury to the perineum. He had obtained a satisfactory result by the usual incisions. He did not see how a difficulty could arise in the diagnosis.

Dr. Knott said a large majority of strictures occur immediately in front of the triangular ligament, and the great trouble in treatment is that injections and instruments are generally stopped here by the ligament.

Mr. Croly, replying to Mr. M'Causland, said incisions could not be dangerous if properly made, and should not go deeper than the tunica vaginalis. The diagnosis should present no difficulty, except where infiltration occurs *behind* the triangular ligament. He had already mentioned a case of urinary extravasation in which the man's scrotum was tapped with a trocar and cannula. The most deceptive cases are those in which infiltration takes place into the sac of a perineal abscess.

A CONTRIBUTION TO RENAL SURGERY.

By THOMAS MYLES, V.-P.R.C.S.;
Surgeon to the Richmond Hospital.

I HOPE I may be pardoned for again venturing to bring under the notice of this Section a subject on which I have on former occasions said so much that your patience can hardly be expected to tolerate more from me.

Yet, at the risk of seeming wearisome and insistent, I feel that the importance of the surgery of the kidney at the present moment is so great that I hope you may, of your kindness, be induced to listen to me for the very few minutes this communication will occupy.

Some time ago a patient died in the Hardwicke Hospital of typhoid fever. I was peculiarly interested in him, because some nine years before I had operated on him for stone in the right kidney. His death, doubtless much to be deplored, gave me an opportunity, unique in its way, of examining a kidney which had been primarily the seat of a calculus, and secondarily the subject of an operation. At the time of the operation the kidney was slightly enlarged, and more vascular than normal. There had never been pus in his urine, nor evidence of suppuration in the kidney. On examining this kidney *post mortem* I found it shrunken to about one-third of its normal size, the cortical secreting portion being cirrhotic and atrophied. At the time of the operation the stone, a large one, was found imbedded in the pelvis of the ureter, with short branches projecting into the infundibula. It was removed by incision of the pelvis in its posterior aspect, the kidney substance not having been touched at all.

The capsule was not interfered with in any way, and his recovery was uneventful.

What, therefore, was the cause of the atrophy of the kidney substance? 1st. Was it the operation, which inflicted no damage on the kidney substance? 2nd. Or was it due to the continuance of a chronic inflammatory process, originally set up by the presence of the stone, and continuing after the cause had been removed? 3rd. Was it trophic in origin, due to injury to the renal nerves at the time of the operation?

Whatever be its cause, the result is most profoundly interesting, and, so far as I can ascertain, no similar fact has yet been brought under the notice of the surgical world. If it be established that atrophy of the kidney follows a simple nephro-lithotomy, our views as to the gravity of the operation are bound to be largely modified, even in the most favourable cases, and when the primary result is most successful.

The next point to which I would ask your attention for a moment is that of nephrotomy and fixation of the kidney in cases of persistent hæmaturia, of which so much has lately been written. Some time ago I published elsewhere notes of a remarkable case, with the details of which I will not trouble you now, which bore on this question. Briefly stated, the facts were:—A young lady with persistent hæmaturia and pain, was found to have two floating kidneys, that on the left being very mobile and tender. Hæmostatics, &c., were tried perseveringly in vain. Cystoscope showed blood flowing freely from left ureter, increased by pressure; kidney exposed by lumbar incision, examined in every way, including the X-ray and screen applied to the kidney lying outside the body. No stone to be either felt or seen, no evidence of tubercle or tumour. Kidney replaced and fixed by my own method; rapid recovery from operation;

wound healed, but bleeding as bad as ever. Subsequent nephrotomy showed an apparently healthy kidney to the naked eye, but my friend, Professor McWeeney, on careful examination, finds that the mucous membrane of the pelvis has undergone an angeio-myxomatous degeneration, and that this was the explanation of the bleeding and the justification for such a very grave operation, which happily proved to be most successful.

That bleeding may be due to a floating kidney is intelligible enough. A kink in the pedicle produces obstruction to venous return, and rupture of the thin-walled vessels in Bowman's capsules. That hæmorrhage so occurring should be cured by fixation is an obvious corollary, but why such a kidney should be split from end to end before fixation, and be put back in two pieces instead of one, is to my limited capacity totally unintelligible. What benefit can splitting the kidney effect that the milder fixation alone will not accomplish? Yet we are gravely told that the cases of hæmaturia that persist after fixation are due to neglect of this so-called trivial addition to the operation. Is it possible that the splitting of the kidney sets up cirrhotic atrophy, such as that found in the case I first described, and so cures the hæmorrhage?

I put forward these few points as suggestive bases for the consideration of the members of the Section, as I confess my own views are very nebulous on the subject.

The methods of fixing the kidney suggested by various operators are so many, so diverse, and, in some cases, so complicated, that it is pretty obvious no one method has as yet obtained general approval.

Under these circumstances, may I claim your indulgence in asking you to give a trial to the method I have adopted for several years past, which at least has the merits of being simple, free from danger, and, as I have found it, efficient.

It is as follows:—The kidney being outside the body, its capsule is split along the convexity from end to end, exactly as the pathologists do it in the *post-mortem* room. Following the method of these gentlemen it is, by the aid of the thumb nail, peeled completely off the posterior aspect of the organ. Some slight hæmorrhage takes place from the raw surface so produced.

The kidney still out of the body its resting place is fully exposed, and as much of the peri-renal fat as possible is removed, bringing into view the aponeurotic covering of the quadratus lumborum and psoas muscles. On this glistening surface the raw back of the kidney is placed, and held *in situ* by an assistant making pressure through the abdominal wall while the wound is being closed. No sutures are employed; there is no splitting of the fascia, or of the tendons of the dorsal muscles; there is no injury done to the kidney substance, and there is, therefore, no danger of producing a septic nephritis. It may be said, How do you know this method is effective? My answer is twofold—1st. By the actual experience of a large number of cases so operated on, in none of which has there been yet any trace of recurrent mobility, though some have been done for more than five years; and 2ndly, because I had an opportunity of examining in one case, by dissection, the results of my fixation operation one month after it had been performed.

This occurred in the case of the young lady suffering from hæmaturia, to whose case I have briefly referred. In her case I first fixed the kidney, in the hope of thereby arresting the hæmorrhage.

One month afterwards I exposed the same kidney through the track of the old incision, and found it firmly and almost rigidly imbedded in a mass of dense fibrous tissue. So firmly was it fixed that I almost despaired of removing it through the lumbar incision alone; but after great and anxious

labour I succeeded in doing so.   Surely such a fact as this,
which can be corroborated by Sir F. Cruise, Dr. Lennon,
and Dr. Lane Joynt, who were witnesses of the operation, is
testimony that cannot be questioned as to the efficiency of
the method.

The last point to which I will ask your attention is the
question as to what is the best method of approaching the
kidney.   Some time ago, in a former contribution, I stated
that, in my opinion, the lumbar route was, in the great
majority of cases, the best to adopt when exposing the kidney
either for examination, fixation, or removal.   Since then my
experience has become larger, and I am, I trust, neither too
old to learn nor too conceited to make honest confession of
error.   During the last twelve months I have operated on a
considerable number of kidney cases, and I have found it
necessary to modify my original procedure.   Every practical
operator—and to them only do I appeal—knows well that
the facility with which the kidney can be exposed through a
lumbar wound varies to an extraordinary extent.   In some
cases it is exposed with the greatest ease, in others with
great difficulty, in a few it is practically impossible without
great danger of injury to the renal vessels.   This difference
depends on a variety of causes, some of which can be fore-
told before operation, some cannot.   Amongst the former
may be enumerated the size of the ilio-costal space, the
obliquity of the last rib, the size of the kidney itself, and the
thickness of the parietal wall.

Amongst the latter are two very important ones that no
care or deliberation can determine beforehand, and they are
the length and elasticity of the renal vessels, and the height
of the cupola of the diaphragm into which the slippery
kidney has a most annoying tendency to disappear.   With a
high arch to the diaphragm, and a short rigid pedicle to the
kidney, the lumbar operation becomes prolonged, difficult,

and therefore dangerous. In one such case I spent over an hour after the kidney was exposed through a large lumbar wound before I succeeded in removing a stone. Since then I have adopted the following modification of the method:— The usual lumbar incision is made, and the kidney examined with the finger. If the kidney is easily reached and delivered through the wound, no further incision is made; but if there is the least difficulty or delay in so doing, I at once make an incision along the margins of the ribs, joining the lumbar incision at an obtuse angle. The combined incision is often eight or nine inches in length, and looks rather alarming to onlookers. The peritoneum is not opened, however, but is stripped from the wall of the abdomen. An assistant now with broad retractors separates the sides, boldly lifting up the lower ribs as he does so.

The result is that the kidney is now accessible to a degree unequalled by any other method, and it can be lifted out, palpated, explored, or removed with a facility that is surprising. It may be asked, Is such a huge incision necessary or advisable, and will not a ventral hernia be the inevitable result? To the latter I would reply that a wound through the thick muscular wall, properly united, is never the seat of a ventral hernia. To the former I would point out that the disadvantage of a large incision is very slight; but the advantages in rapidity, ease, and thoroughness of the operation cannot be measured by any standard we possess.

Since the introduction of anæsthetics, rapidity of operation has lost the pre-eminence formerly attached to it; and some few years ago men even prided themselves upon the leisurely coolness with which they operated. Recent researches have shown that there is an undoubted correlation between rapidity of operation and freedom from sepsis.

It has been proved experimentally that the operator's hands, carefully sterilised at first, become, at the end of a

prolonged operation, rich in micro-organisms carried up from the depths of the glands in the skin by the sweat and sebaceous secretions. Every time such hands touch a cut surface a fresh culture is made, and the danger of septic infection increases with every moment of delay, and with every effort that causes the surgeon to perspire. Formerly when a patient of mine died twenty-four or thirty-six hours after operation I attributed it to shock, unavoidable and inevitable. As I grow older I believe less in shock. In the absence of severe hæmorrhage, death from so-called shock is due to acute sepsis.

More especially is this the case in kidney operations. Think of what we have to deal with in such cases. One or both kidneys are diseased, otherwise operation would not be contemplated. In sepsis, the ptomaïn products are largely removed through the urine.

Any addition to their normal work may throw a strain on the kidneys more than they can bear, and the patient, already enfeebled, rapidly succumbs. The large incision, therefore, by making the operation more rapid and less laborious, removes the most potent factor in the production of so-called shock, or, as I prefer to call it, fatally acute sepsis.

———————

Sir William Stokes had under his care some years ago a man who suffered at times intense pain from a movable kidney. He exposed the kidney by an anterior incision, and was surprised to find it occupying apparently its normal position. He thought it would be better to be content for the time with merely exposing it, and subsequently to operate again if necessary. The patient's symptoms completely disappeared, and he was able to resume his business. If the mere exposure of the kidney were sufficient, and the subsequent fixation were due to adhesions after the operation, the question arose whether it was necessary to strip so much of the capsule.

Mr. M'Ardle congratulated Mr. Myles on having so fully demonstrated the possibility of fixing the kidney without the risk attendant upon suture. Six years ago Brandt showed very clearly that when a suture passing through the kidney engaged one of the arterial arcades hæmorrhagic infarction resulted. He thought the operation of suturing the kidney should be abandoned. The question of reaching the kidney was one of great moment. In dealing with a kidney that was to be left behind he would not dream of cutting down in a semilunar line, just as he would never cut down in the lumbar region when he had made up his mind to remove the kidney. In the first case, where the opening was made in the front of the abdomen, when the sutures had been passed through the kidney, it was very difficult to locate the position to pass the needle through at the back. His reason for not adopting the lumbar incision in nephrectomy was that he wished to determine whether the other kidney was engaged. Some time ago a patient came to him for operation for a tumour in the left side, with persistent pain. There was no means of determining that the right kidney was at fault, and believing it to be sound he removed the left kidney containing a large cyst. The wound healed, but up to the fifth day the patient had passed no urine, and when he came to examine the right loin, fearing that a calculus had blocked the ureter, he discovered that the kidney was calcareous. The patient died on the ninth day, with symptoms bordering on anæmia. This demonstrated to him the folly of cutting into the loin for the total removal of the kidney. The combined operation gave him an opportunity of examining the kidney that was not to be interfered with, and enabled him to carry out extra-peritoneal resection of the kidney.

Mr. Croly had a case many years ago of direct injury to the kidney caused by a bell falling on a man. The patient bled profusely from the kidney, and the following treatment was adopted : The patient's arm was tied up, and he was bled, about 15 ozs. being withdrawn. The hæmorrhage from the kidney ceased completely. The treatment he would now adopt in dealing with a torn kidney would be to cut down on the kidney and secure the bleeding point. The term " floating kidney " should be expunged from surgery. The late Mr. Hamilton told him that in all the subjects he had dissected he had never seen a floating kidney. The proper way to fix the kidney was by stitching the capsule. As to Mr. Myles' suggestion *re* sepsis, where he (Mr. Croly) had

had fatal termination, death occurred in a few hours.   Sepsis would not set in so rapidly.   Both in removing the kidney and in exploring for stone he would make a lumbar incision.

DR. LANE JOYNT, speaking of the application of the Röntgen rays, said he had made very careful preparations in one of Mr. Myles' cases, but the result was a complete failure.   The reason of that was that the operation was carried out in a well-lighted room which was suddenly darkened, thus rendering it impossible to see. From long experience he thought that after the lapse of half an hour in a darkened room many details would be visible which previously were not to be seen.

MR. MYLES, replying, said that Dr. Lane Joynt had spent a great deal of time and labour so as to give the Röntgen rays a fair trial, with the kidney outside the body.   The kidney was as opaque as bone, and no calculus could throw a deeper shadow. Possibly a sensitive plate would catch a shadow not perceptible to the human retina.   He joined issue at once with Mr. Croly as to the fixing of the kidney by stitching the capsule.   A single stitch would make it adhere at one point only, and that would be liable to give way, while with a more permanent suture there was a possibility of infection.   With regard to the double operation, he thought that in such a grave condition as renal disease a surgeon was not justified in doing anything which added in the remotest degree to the gravity of the operation.   Would it not be possible, where incison was made in the lumbar region, to put the hand across the abdomen and feel the other kidney ?   As to Mr. Croly's remarks concerning sepsis, he thought the idea much the same. With diminished eliminating powers a very modest degree of sepsis, not necessarily associated with the manufacture of pus, would be sufficient to produce death.

ATTACHED FOREIGN BODY IN KNEE-JOINT REMOVED BY SECTION OF PATELLA.

By R. L. SWAN, F.R.C.S.;

Surgeon to Steeven's Hospital;
Surgeon to the Dublin Orthopædic Hospital.

A YOUNG man, aged twenty-one, suffered from a loose body in the knee-joint. This was felt at the inner side. Fixed and removed in the usual manner. Six months afterwards he began again to suffer inconvenience; the joint frequently became locked with violent pain, and an attack of synovitis resulted on each occasion. No clinical evidence of loose body was discoverable. At last the frequency of periods of disability was so numerous that the limb became useless, and he begged for relief at any cost. On exposure to the X-rays the dim outline of an opaque body was seen in the intercondyloid space. While at the skiagrapher's the joint became again locked, and a picture having been taken it was found that the loose body had disappeared.

Having explained to him and his parents the serious nature of the operation designed, an incision was made in the long axis of the limb at the outer side of the joint, with its upper extremity opposite the middle of the patella. It was not possible, however, owing to the density of the tissues, to gain access to the joint by this means. Accordingly, a transverse section of the patella was made with the saw, and the loose body was found attached to the inner surface of the outer condyle by a strong fibrous pedicle, which had to be cut across with a scissors. The patella was wired. A perfect cure resulted. The patient was exhibited one year after operation with complete restoration of the movements of the joint.

Mr. Myles asked would Mr. Swan have undertaken the operation, considering the difficulties of the previous one, if he had not been able to demonstrate the foreign body with the X-rays? What was the material used in suturing the patella? Had he drained the joint?

Mr. Croly asked did Mr. Swan know there was a large cartilage in the joint before he used the X-rays? Could he not have performed the operation by shoving the patella to one side and getting at the notch between the condyles without complicating the case? Did he attribute a great deal of the result to the very free openings made into the joint?

Mr. Lentaigne asked if Mr. Swan could explain what took place when the joint became locked, and how was the sudden sickening pain to be explained. It seemed to him to be due to sudden and violent strain on the ligaments. What incision was used?

Mr. Swan, in reply, said he would not have ventured to operate if he had not the skiagram before him, because without its aid there was, to some extent, only a theoretical opinion as to the nature of the disablement of the joint. He used two silver wire sutures. He did not drain the joint beyond the necessary cleansing in the progress of the operation. He treated it in the same way as a healthy peritoneal surface in laparotomy. As regarded the advantages of free opening into the cavity, of course the joint could be drained directly, but it might be infected more readily through a large than through a small opening. He did not think the valvular incision erred in principle. Punctured wounds were perfectly safe if the instruments which produced them were aseptic. In reply to Mr. Lentaigne's questions, he could only say that the foreign body became jammed between two sensitive surfaces, and by reflex irritation caused contraction of the quadriceps extensor. He had carefully considered the incision to be made before the operation, and in order not to have the cicatrix adherent over the patella he made a convex incision into the soft parts, with the concavity directed downwards.

THE POSITION OF MURPHY'S BUTTON IN MODERN SURGERY.

By J. S. M'ARDLE, F.R.C.S.;
Surgeon to St. Vincent's Hospital, Dublin.

[Read in the Section of Surgery, March 2, 1900.]

As far back as 1894 Dr. J. B. Murphy, of Chicago, wrote to me in the following terms:—" I send you a tabulated list of all cases reported to me up to date. I wish you would write a short article for the *Dublin Journal* on the subject, using the tabulated form which I send you as the basis of the article; and I wish you would lay particular stress on these facts—first, that the button has not produced the symptoms of obstruction in a single case so far; second, that it has been found retained in the intestinal tract *post mortem* twice. Once it was held there by a secondary carcinoma of the lower portion of the bowel, and, second, by adhesive bands constricting the bowel. In neither case did it produce symptoms, and in neither case did it have anything to do with the death.

" In looking over the history it will be noted that all the buttons have not been reported voided, and others have not been passed for a long time after the operation. The explanation for these cases, I believe, rests mostly, as in the first, in the fact that they were either overlooked at the time passed, or, as in the second, they were retained above the sphincter ani. In one of my own cases in which the button was not passed I made an examination, and found it resting loose in the rectum. The history of the case leads me to believe that it passed to that position two weeks before, and the patient described the sensation of its passing at that time.

" In some experiments by Dr. Chaput he found the large button did not pass readily through the intestinal tract in the cadaver. Every practical surgeon knows that there is a great difference between the distensibility of the intestine in the living subject and in the cadaver. Where we have an obstruction of the bowel for 24 or 48 hours we know it expands two or three times its normal size. This is why the button passes so readily through the canal. Third, that so far there has been no case of non-union reported, except where the history and *post-mortem* conditions show conclusively that there was infection from without at the time of the operation. These and any other points that you may wish to make pro or con to the button may go to make up the article."

Notwithstanding my desire to please our distinguished surgical *confrère*, I avoided bringing this matter before the Profession in Ireland until I had an extended personal experience of the appliance alluded to, and although long before any other European surgeon had carried out the operation of lateral anastomosis by a metallic appliance I had had several successful cases, I nevertheless refrained from publishing these cases, or entering on the subject until my own cases gave me sufficient data upon which to found a reliable judgment. I have listened with some amusement to men discussing the merits and demerits of this appliance whose only experience was derived from hearsay evidence. Some who had seen Murphy's button inserted spoke as if they had themselves an extended and infallible knowledge of the subject. Some who had inserted a button, in explaining the details of the procedure proved conclusively that they were not carrying out Murphy's method. These failures recorded were not to be attributed to the inert materials employed in the operation.

Before calling attention to the cases upon which I

base my communication, I desire to place on record the view I hold in common with a great many other surgeons, that this button is not of universal applicability in the carrying out of intestinal anastomosis, but that taken all round it has done more to advance this department of surgery than any other method of ancient or modern times.

In order to determine the place which Murphy's appliance holds in surgery we must contrast the results obtained before his exhaustive experimental efforts placed the procedures alluded to on a firm basis. For the purpose of comparison I shall confine myself to the most important, as it is the most ordinary and the most dangerous, class of cases with which we have to deal—namely, those in which enterectomy was carried out for the relief of gangrenous hernia.

Of the instances of resection for gangrenous hernia, prior to Murphy's time, we find that of 76 cases, 41 died; 11 from yielding of the sutures; 8 from exhaustion; 2 from carbolic acid poisoning; 2 from asphyxia; 12 from septic peritonitis; 3 from simple peritonitis; in the others the cause of death is not noted. Now, a study of these cases will show on what this high death-rate depends. Of the 11 cases in which the sutures yielded, in 4 the fatal result was brought about by an overloaded condition of the bowel, in 3 it was due to imperfect suture, and in the remaining 4 to the low vitality of the bowel at the suture line, one of them having the mesentery detached for half an inch. In most of the cases death resulted from extravasation and septic peritonitis. Compare this with the results of the application of Murphy's button even in the earliest times in the hands of those who were acquainted with its proper application. Up to the year 1896 I was enabled to verify the results in 48 operations, as follows :— Internal strangulation, 14 cases with 1 death; gangrenous

hernia, 12 cases with 2 deaths; fæcal fistula, 9 cases with no death. Thus in the 48 cases there were 3 deaths. This support of the procedure which I am here to discuss as an impartial advocate convinced me that, in justice to my *clientèle*, I should adopt this method of treatment where admissible, because it was founded on exhaustive experimental research, and supported by results so much more favourable than any of the other methods. The cases which I desire to bring under your notice include examples of lateral and end-to-end anastomosis in the different regions of the intestinal tract.

PROFUSE HÆMOPTYSIS; EXTENSIVE ULCERATION AT PYLORIC END OF STOMACH.

CASE I.—A. F., aged twenty-four years, came under my care at St. Vincent's, when she gave the following history :—For two years she had had vomiting soon after meals, at first without any blood, but for ten months previous to admission there was much blood in the discharges from the stomach. She had been four months in another hospital, where every effort was made to check this hæmorrhage by medicines, and then laparotomy was carried out. The stomach being examined through an incision near the pylorus, much blood was found in the stomach, but no effort was made to deal with the ulceration which was present. The abdomen was closed, and union by granulation took place, leaving a great scar in the middle line. Hæmatemesis continuing, she came under my care, and on washing out the stomach I found that free acid was present in fair amount, and that bleeding was induced by every insertion of the douche tube. Distension with gas proved that the stomach was greatly dilated, and there was a long-continued whistling sound heard, most intense midway between the ensiform cartilage and umbilicus, during the passage of the gas. This sound was distinct in a line to the right and downwards, indicating the passage of gas through a narrow channel. Now and again a sudden rush of gas could be heard over the right semilunar line, showing that the pylorus was acting. I marked out the stomach on the abdominal wall for the class, and, selecting Billroth's incision, I cut through the rectus abdominis. Thus gaining free entrance to

the upper abdomen, I exposed the anterior wall of the stomach. I found the pylorus pushed to the right and lower than usual. From a point $1\frac{1}{2}$ inches to the left of this valve a small scar extended for 3 inches, puckering the peritoneal coat and narrowing the right end of the stomach, as at X, Fig. 1. To the left of this contracted part sacculation had taken place, so that the stomach projected into the wound. Selecting this prominent part of the organ, I made an incision large enough to admit one-half of a medium-sized Murphy's button, the other half I inserted in the jejunum, as shown in the figure, thus insuring the passage of food through a large portion of the stomach, but allowing its escape without coming in contact with the diseased part.
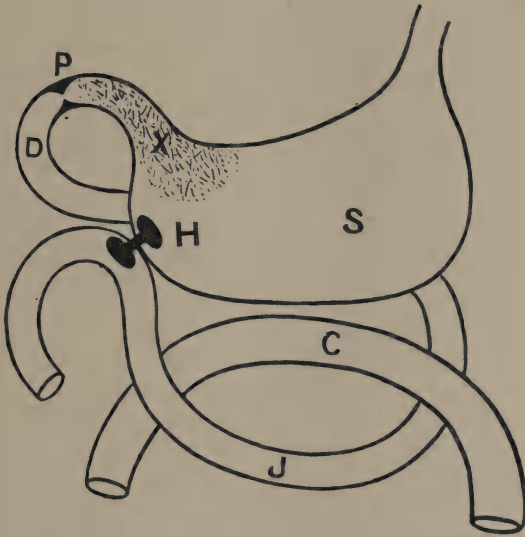
Fig. 1.

P, pylorus; S, stomach; D, duodenum; J, jejunum; C, transverse colon; H, Murphy's button; X, scar tissue.

Owing to the low vitality of the patient the first few days after the operation were anxious, and dark blood was noticed in the motions, but no vomiting of blood occurred then or since, and the patient made an uninterrupted recovery. The only distress she

had was that at times a regurgitation of bile took place owing to the position of the new opening. She can take even the coarsest food without pain resulting, and there has never been the slightest trace of hæmorrhage from the stomach or the bowels since the first few days after gastro-enterostomy was carried out.

PERSISTENT VOMITING; ULCERATION ALONG LESSER CURVATURE.

CASE II.—The next case to which I wish to refer is that of D. C., aged twenty-six years. He was sent to me by Dr. Walsh, of Mallow, who, on account of rapid emaciation from persistent vomiting, thought there was little hope for his life. He had small, weak pulse, constant vomiting after the slightest amount of food, and he was constantly cold and clammy. Nutrient enemata were tried, but without much result. Gaseous distension proved that the stomach was much distended, and the pylorus constricted. I carried an incision from the left costal arch at the eighth cartilage downwards, and to the right, midway between ensiform and umbilicus to end, at right semilunar line. On exposing the stomach I found it dilated as depicted in Fig. 2. Along the lesser curve, as at X, there was a thickening, over which the serous coat was puckered into folds. The slightest touch on this part caused a marked contraction of the entire stomach.
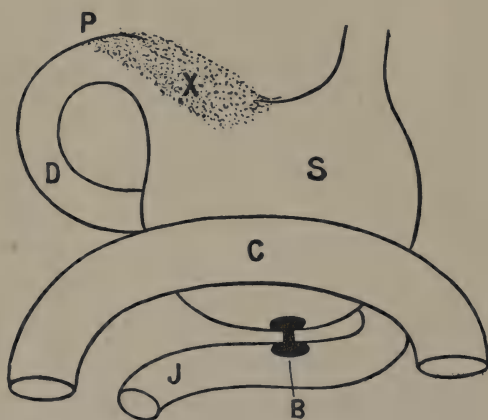

Fig. 2.

P, pylorus ; S, stomach ; D, duodenum ; J, jejunum ; C, transverse colon ; B, Murphy's button ; X, scar tissue.

In this case I determined on carrying out an operation which would not be followed by regurgitation of the contents of the duodenum. Selecting the proper spot in the transverse meso-colon I made an opening large enough to allow a fixation of the posterior wall of the stomach (S) to the first part of the jejunum, as shown in Fig. 2. The operation was a rapid one, and notwithstanding the weakness of the patient he soon rallied. Three days after operation liquid food was allowed; four days later solids. The abdominal wound was soundly healed on the eighth day, and since that time he has rapidly gained in weight.

CHRONIC ULCERATION OF STOMACH, WITH ENORMOUS DILATA-TION AND PERSISTENT VOMITING.

CASE III.—B. K., aged twenty-one, came under my care on the 10th Nov., 1898. For a long time he had been suffering from epigastric pain and distension of the upper abdomen from frequent nocturnal vomiting. For some weeks he had been under the care of Dr. M'Hugh, who kindly asked me to see him. By careful washing out of the stomach the boy had been much relieved, but as no food seemed to pass beyond the pylorus, the stomach was becoming more and more dilated; no real improvement in his condition occurred. The morning of the operation I witnessed the evacuation of the stomach through a Kussmaul tube. The liquid food he had taken on the previous evening and during the night had already decomposed, and the discharge—measuring two quarts—was extremely offensive. The stomach was washed out thoroughly with warm boracic solution, and the patient put under an anæsthetic. I made an incision from the ninth costal cartilage on the right, extending downwards on the left, midway between the umbilicus and the left costal arch, for a distance of $5\frac{1}{2}$ inches. Stomach was found enormously dilated and hypertrophied, the pyloric end drawn upwards towards the liver, and the seat of marked thickening without any nodulation. I turned the great omentum and transverse colon upwards on to the chest wall, keeping them enveloped in warm sterilised towels. Opening the mesocolon I brought the posterior wall of the stomach into view and inserted one half of a Murphy's button; the other I introduced into the jejunum, just at its beginning. Locking the button joined the organs in the desired position.

Notwithstanding his weak condition the patient bore this short operation well, and I found him the next morning free from pain

and brighter than he had been for many months. Four days after he was able to take liquid nourishment with comfort; in a week he partook of solid food, and on December 10th he left hospital perfectly well.

These cases I have exhibited during the past Session of the Royal Academy of Medicine in perfect health.

INTUSSUSCEPTION OF SIGMOID; COMPLETE OBSTRUCTION.

CASE IV.—Miss M., aged twenty-five, was admitted to the private hospital, Lower Leeson-street, in April, 1897, suffering from acute intestinal obstruction, which resulted from an intussusception of the sigmoid flexure of the colon. Assisted by Dr. Horne and Mr. Fagan, I opened the abdomen, released the sigmoid, and joined the descending colon to the rectum with Murphy's button, as shown in Fig. 3. Although the patient was in a state of collapse she rallied soon after the operation, and left the hospital quite well 16 days later.
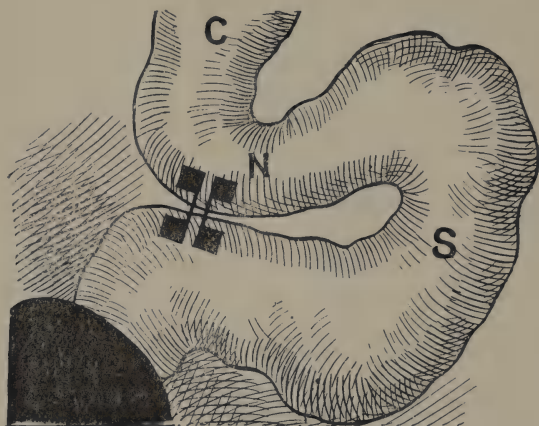
Fig. 3.

GANGRENOUS FEMORAL HERNIA; RESECTION.

CASE V.—Miss H., aged thirty-six, came under my care in 1898. She had arrived by the night mail from Limerick, and was much exhausted. I found that she had a strangulated right femoral hernia, and as time seemed to me to be of importance, assisted by

Mr. Lewis More O'Ferrall, Dr. Reginald White, and Dr. Ahearne, I exposed the small hernial sac, which was dark purple in colour and surrounded by large serous exudation. The sac contained about two drachms of very fœtid, brownish-yellow pus, bathing a loop of small intestine, covered with greyish green patches. The intestinal wall was thick and doughy; the gloss had disappeared entirely from its serous surface. After thorough irrigation with warm corrosive (1 in 1,000) I cut Gimbernat's ligament, and as this did not enable me to draw down the intestine, I cut through Poupart's ligament. All the time a stream of warm boracic solution was playing on the wound and over the damaged intestine. I now brought down through the wound a long loop of small intestine, and as I found the mesentery thrombosed I was obliged to resect seven inches of the bowel with the affected portion of the mesentery. I joined the sound portions by a medium-sized button, dried all the tissues carefully, and returned the sound intestine to the abdominal cavity. In order to make up for the deficiency in the
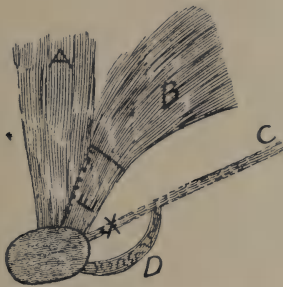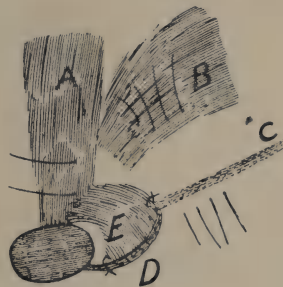
Fig. 4.   Fig. 5.

abdominal wall, brought about by the section of Poupart's ligament, I split the conjoint tendon (Fig. 4), and cutting the lower and outer part two inches from its insertion I joined the piece thus free (E, Fig. 5) to the pectineus muscle below and to the outer piece of the cut ligament (D, Fig. 5); deep and superficial suture of the wound completed the operation. The course of this case was uneventful; the button passed on the 17th day. The patient left Dublin on the 22nd day after operation, and she has since been in perfect health.

STRICTURE AT SPLENIC FLEXURE OF COLON.

CASE VI.—Mrs. M. was sent to me by Dr. Darby, of Monaster-evan, to the Private Hospital, 96 Lower Leeson-street. He had correctly diagnosticated the obstruction in the colon, and as this had been complete for five days, and as the patient showed signs of extensive peritonitis, I thought it right to operate immediately. At 9 p.m., within an hour of her arrival in Dublin, I carried out the following operation, assisted by Dr. Horne and Mr. Fagan :— I opened the abdomen in the left semilunar line, and found the obstruction to exist at the splenic flexure of the colon. I joined the transverse and descending colon by a large-sized Murphy's button (as in Fig. 6), and after breaking down a great number of recent adhesions I closed the abdominal wound. The patient progressed rapidly ; on the 7th day she was allowed up, and two days later the button was voided. A week later she returned to the country, and has since enjoyed perfect health.
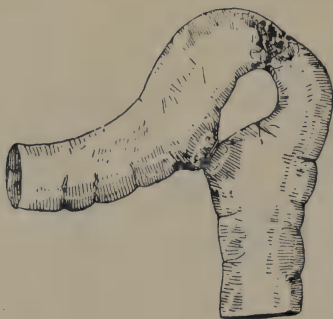
Fig. 6.

MECKEL'S DIVERTICULUM CAUSING INTUSSUSCEPTION.

CASE VII.—Miss E. J., aged twenty-one, came under my care in August, 1899. For some time she had suffered from recurrent attacks of severe abdominal pain, chiefly referred to the right of the umbilicus, and simulating the pain of appendicitis. When she came under my care the abdomen was enormously distended, tympanitic in front, but dull at the loins and lower abdomen. Her pulse was 140, temperature 103·6°, and she seemed almost uncon-scious, so that very little ether was required in the performance of the following operation :—I made a long incision in the central line

of the abdomen, giving exit to a considerable quantity of muddy
serum full of shreds.   The intestines were covered with great flakes
of lymph, and glued together by adhesions.   On freeing these and
bringing the point of intestine at fault into view, I found an intus-
susception at the lower end of the ileum.   There was complete
obstruction at this point, the bowel-wall being greatly thickened
for about four inches.   I joined the healthy upper portion of ileum
to the ascending colon by a medium-sized button (as in Fig. 7)
and closed the abdominal wound, leaving a drain in its lower
angle.   For 10 days after the operation this patient's condition
was very low; gradual improvement then set in, and five weeks
after she came under my care she left the hospital the picture of
health.
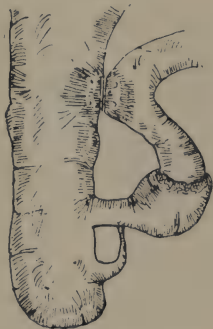
Fig. 7.

This patient kindly presented herself at the first meeting
of this Section of the Academy, and she still retains the
good looks she exhibited on that occasion.   In the course
of this case, during my absence from town, I had the
assistance of my colleague, Mr. Fagan.   The button in
this case has not been recovered although passed.   An
X-ray photograph, which I exhibit, shows that there is no
hope of my having a second operation for its recovery.

It is a contrast to the next picture (Fig. 8) which I desire
to exhibit, because in this you see a Murphy's button rest-
ing below the brim of the pelvis; and I can assure you no

manipulative effort of mine sufficed to move it thence.   In this case—which had been under my care some seven months before—I had placed the button in a very thickened large intestine, and when I operated for its removal I learned the cause of its failure to be expelled.   I opened the healthy bowel four inches above the position of fixation, and after considerable traction on the button with a strong forceps I released it from a dense annular band, which the pressure of the button was not capable of destroying.

Fig. 8.
Left half of pelvis, viewed from behind, showing Murphy's button of imperfect shape.

This case demonstrated to me the danger of using buttons such as are depicted at Fig. 10 B, and I publish it as a warning to others that they may not be obliged to discover the defect by unpleasant experience.

EXTENSIVE ULCERATION OF CÆCUM AND COLON; ILEO-COLOSTOMY; CURE.

CASE VIII.—Mrs. L. C., aged forty-two years, was sent to me by Dr. Carroll, of Dromahair, with a history of chronic intestinal obstruction, with a note that she suffered from displacement of the right kidney. On examination I found that the right kidney was movable, and that the cæcum and ascending colon were thickened, but not fixed, as the patient had much occasional hæmorrhage from the bowel. I was convinced that ulceration was present. On January 10th, 1900, I made an incision four inches in length in the right semilunar line, and on opening the abdomen I found the great omentum adherent to the front of the cæcum and the edge of the pelvis; on freeing this, and pushing it upwards, I found the thickening which I had already diagnosticated, the meso-colon being the seat of several enlarged glands extending towards the vertebral column. Feeling that resection of the bowel could end only in death, and that there was a possibility of isolation of that part of the bowel leading to its atrophy, I joined the ileum to the central part of the transverse colon by a medium-sized Murphy's button. Although the patient was greatly emaciated she rallied rapidly after the operation, and on the third day there was a natural evacuation of the bowels. On the fourth and fifth days there was some pain, which I attributed to the button becoming detached. This was relieved by turpentine and oil enema. The button passed on the ninth day, and since that time evacuation of the bowel has been regular. All pain has disappeared, and the patient has been able to attend her ordinary avocations.

In discussing the subject of intestinal anastomosis one may divide the methods into four separate groups. First, those in which no appliance is used to aid in the application of the sutures; second, those in which a temporary support for the bowel is employed, and removed immediately after the sutures have been inserted; third, those in which the

appliance is left to be absorbed; and fourth, where a metallic appliance is used and must be passed through the intestinal tract.

The following are chief amongst the methods:—

1 {
  a. Jobert's.
  b. Czerny-Lembert's.
  c. Wölfer's.
  d. Maunsel's.
  e. Cheatles'.
} Without support.

2 {
  Laplace.
  Halsted.
} With temporary support.

3 {
  Paul.
  Ullman.
  Allingham.
  Mayo Robson.
  Ball.
  Hayes.
  Senn.
  Dawbarn.
} With absorbable support.

4 {
  Murphy.
  Sultan.
} With inabsorbable support.

These different methods have been so thoroughly advocated by their respective inventors, and so criticised by those otherwise interested, that I would not dare to occupy the time of the profession with any comments on their merits or demerits, further than to say that the most brilliant operators have not yet any of them made much impress on the high mortality which a decennium ago attended operations of this class carried out by the most simple means. I will therefore confine myself to a discussion on the subject in hand—namely, the current value of Murphy's button.

Mr. Murphy should feel highly complimented if universal criticism is any proof that his appliance has been discussed on its merits, for in the whole history of surgery no method of treatment has received at the hands of the profession so

extensive an investigation. That the criticisms are not always favourable does not prove that the failures reported were the outcome of the adoption of his principle of treatment. I shall detain you while I call attention to some of the objections to its use put forward by men of high surgical standing—

1. Contraction of the intestine at the site of operation.
2. Sloughing of the intestine from pressure.
3. Septic peritonitis.
4. Retention of the button.
5. Kinking of the bowel.
6. Faulty position of the button, when once inserted cannot be easily rectified.
7. The expense and the difficulty of having the proper size at hand.

In reviewing the cases brought up in support of the first objection I can find no instance in which healthy portions of the intestines were joined and subsequent narrowing of any kind resulted. With regard to the second, in the recorded histories which I have come across I find that sloughing occurred—(a) When too large a button was used; (b) when the button was inserted near to cancerous or other diseased tissue; (c) where the blood-supply to that section of the bowel had been impaired by faulty suture of the mesenteric cleft; (d) where a widely dilated and functionally active piece of intestine was joined to one which, from long disuse, had become atrophied.

The third objection, vigorously supported by Professor Senn, who may be called the father of this department of surgery, is not grounded on the solid basis of fact, either experimental or pathological.

The fourth objection (retention of the button in intestinal canal) is supported by many cases, including the one to which I have referred in my own series. It is easy to

explain the failure of the button to pass in the case to which I allude. It was inserted in a bowel so thickened and fibrous that section with a knife even was difficult. That it did not cut its way through the superimposed walls is not difficult to understand and that a dense ring should remain. The real explanation of the retention of many buttons is that the button was faulty in construction, or that it was placed in a position which the appliance should never occupy.

The next objection (5), kinking of the bowel owing to the weight of the button, does not hold with any man accustomed to dealing with intestinal surgery. It is only when the bowel is semi-paralysed that the weight of the button could influence its position in the abdomen, and where paralysis, partial or complete, is present it is the duty of the surgeon to so support the bowel by fixation to the abdominal wall, or otherwise, that no improper position can be assumed by the viscus.

The next objection (6) lodged against this appliance is very strange in the mouth of a surgical expert—*That faulty application of the button cannot be easily rectified, and may require a further resection of the intestine.* I would ask the critic who advances this objection why should any surgeon in his sound senses apply the button wrongly, and can he attribute to an appliance the fault of its application?

The last (7) and most serious objection, which one surgical writer makes lengthened note of, is the expense of the appliance. To this gentleman I would say, human life is very cheap, if on the other side of the scale we would place the paltry cost of any appliance, however extravagant in price.

I have now passed in review the numerous objections scattered over the literature for the last eight years, and, for my part, holding in respect many of those who have found fault

with this procedure, I feel that, considering the reduction in mortality which has been admittedly brought about by this apparatus (from 60 to 30 per cent.), it is criminal to experiment on the human subject with appliances the worth of which has not been determined by experimental research and proven by a long series of brilliant results.

ERRORS IN MANUFACTURE OF BUTTON.

(a) The clips which hold the two portions together may not hold under pressure of thick-walled intestine if their teeth are imperfect.
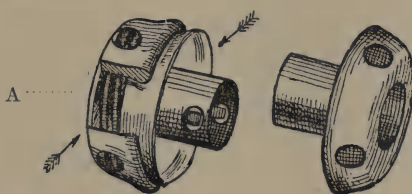
Fig. 9.

(b) The clips should be riveted at base, as the solder has yielded, setting free one or both clips. Before using a button, fairly vigorous traction should be made to test the button for these defects.
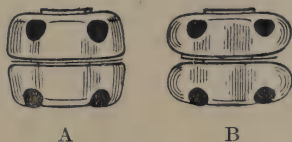
A   B
Fig. 10.

(c) The spring (A, Fig. 9) is sometimes too weak to complete the separation of the inverted bowel-wall, and so a ring of tissue supports the button instead of sloughing off.

(d) The flanges of the button should, when pressed home, leave no appreciable furrow between the spring

flange and the female half of the button. Fig. 10 A represents a button which causes necrosis of the inverted portion of intestine, while Fig. 10 B is bound to leave a ring of tissue to retain the button, or later on to form a stricture. In fact the button in this shape is open to the strongest objection brought forward against the various bobbins now in use.

ERRORS IN JUDGMENT.

(a) The history of many recorded cases of failure bear evidence of the fact that it has been sought to join pieces of intestine already the seat of infective processes, which left little hope of union taking place, or in which limitation of necrosis to the part engaged by the button was quite impossible.

(b) Not a few cases of retention of the button, as shown in my case, were the outcome of endeavouring to join the intestines where they were already greatly thickened, and, therefore, not well suited for this method.

(c) Several cases have come under my observation in which the effort has been made—with baneful result—to join a small to a large intestine by end-to-end anastomosis; and in a case of recent date failure attended an effort to join a widely-dilated intestine above a stricture (by end-to-end anastomosis) to the constricted and atrophied part below, with the result that overstretching of the smaller segment led to necrosis of the ring of bowel surrounding the button. This was a case for lateral anastomosis if it was surgery to carry out an anastomosis of any kind.

(d) Again, failure has been invited by placing a button in such a position that the chances are all in favour of its falling into a portion of the intestine from which there is no exit. This has been done in many cases, the button being found above strictures or retained in loops of the intestine. The existence of such obstructions to the evacua-

tion of the button should be known beforehand, and thus many failures attributed to the button would be avoided.

When there is injury or disease of any part of the intestine which is fixed, end-to-end anastomosis should not be undertaken; the proper procedure here is to remove the disease or close the wound in the bowel, and carry out a lateral anastomosis. Especially is this necessary in cases where thickening is present from enteritis, as it is under these conditions quite impossible to properly invert the edges of the bowel between the halves of the button, and sutures of support, if necessary, do not hold in the softened tissue.

ERRORS IN TECHNIQUE.

(*a*) In circular enterorrhaphy the passing of the purse-string suture so as to close the mesenteric interspace, as in Fig. 11, is of much importance. Should this loop of suture surround a large mesenteric artery so as to occlude it, necrosis of a segment of the bowel is certain to occur.
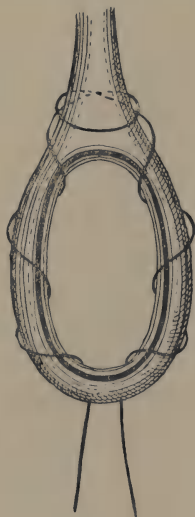
Fig. 11.

(*b*) If there be much fatty tissue in the interspace along
the concavity of the intestine, as in Fig. 12 A, its inversion
by the closing of the purse-string suture will introduce an
incompressible mass between the halves of the button at
the mesenteric edge.   This will prevent an even compres-
sion of the inverted bowel-wall, and lead to leaking where
pressure is insufficient, or to extensive and acute necrosis
where violence has been done to the tissues at the
mesenteric border.

Fig. 12.

(*c*) Wherever the button is used, if the suture is care-
lessly applied, it becomes impossible to completely invert
the bowel-wall into the hollow in each flange of the button
as it should be, and as it appears in Fig. 13 ; thus at some
point an incomplete closure of the bowel results, and extra-
vasation of the bowel contents is rendered likely.

(*d*) The inclusion of too much bowel-wall in the encircling
suture makes it impossible to so place the suture in the
interior of the button that portions of the silk lie between
the opposed serous surfaces where union is supposed to
take place, with the result that union is delayed, and
often infection travels along the suture line to the peritoneal
surface.   If in these cases protective adhesions have not
formed early peritonitis is certain to occur.

(e) To assist in the introduction of the male button I
got Messrs. Fannin to make a shouldered forceps for keep-
ing the spring flange down, thereby allowing the passage
of this half through the same size of incision as the other
half.   When the incision is too long the purse-string has to
crowd into the hollow of the button much more tissue than
it can with advantage accommodate.
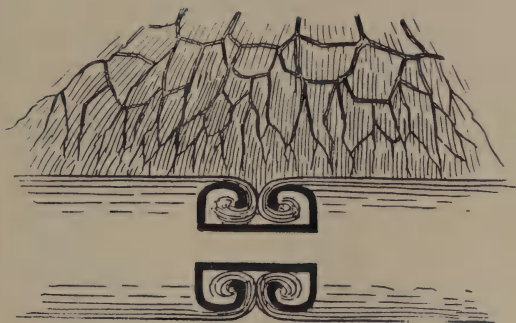
Fig. 13.

By carefully studying the history of the published cases
in which death has followed the application, one can easily
discover the cause of failure, and it is manifestly unfair to
ascribe to the button the disasters which have arisen from
some of the foregoing causes.
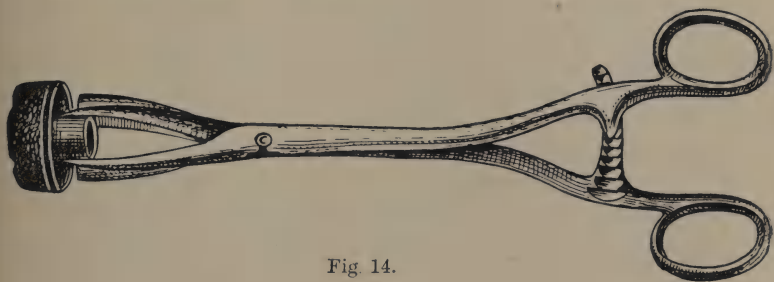
Fig. 14.

There will be a fair chance of determining the value of the different methods of intestinal repair during the war with the Transvaal. The Burghers have a keen appreciation of the vital part of the Briton, and so we learn that abdominal wounds are very numerous, and as many of these are not of a fatal nature, any one who honestly endeavours to do the best that can be done for the sufferers has a favourable opportunity of illuminating the surgical history of our time. With our present advanced knowledge of the surgery of the head, chest and abdomen, and with the added help of X-ray photography and the power this peculiar light gives us of seeing through parts heretofore darker than the darkest Africa, the work of the present well-equipped staff in South Africa should open a new era in surgery. It is my hope that the department of surgery with which I have dealt in this paper may be placed on a sound basis by the efforts of our distinguished *confrères* attached to the forces.

MR. MYLES said Mr. M'Ardle had omitted one of the greatest recommendations of the button—viz., that a surgeon with a Murphy's button in his outfit was in a position to cope with any intestinal emergency. The rapidity with which it enabled him to carry out his work, the efficiency with which it could be used, and its simplicity when properly utilised gave it a commanding position. A popular conception regarding Murphy's button was that it was an instrument which anybody might use, but, like all other surgical instruments, it required care and intelligence on the part of the operator, who should practice its insertion many times on the cadaver before employing it in the living subject.

MR. FAGAN said that, as far as he could make out, no person had hitherto gone into details as to how the operation should be carried out and the dangers attending the use of faulty appliances. In Continental literature he had seen records of cases in which the button had been a failure, but it was clear that Murphy's method of application had not been adhered to. On that account he

thought the statistics hitherto published on the matter were mis-
leading.

Mr. Heuston said he had never used a Murphy's button, and
probably never would use it. In surgical procedures the operator
should adopt the easiest, simplest, and most natural method. He
did not consider it a natural method to leave a foreign body in the
intestine until gangrene occurred. Although there had been trouble
in only two of Mr. M'Ardle's cases, still, in the hands of others,
serious trouble had arisen, even in cases where it should not. His
own experience had not led him to go beyond the use of his fingers
and suture. An operator skilled in the application of suture would
stitch the intestine in nearly the same time as Murphy's button
occupied. As to the giving way of unsupported stitches, in skilful
hands there was just as little danger as when Murphy's button was
employed. He had performed many lateral and end-to-end anasto-
moses and had never seen the stitches give way.

Mr. Tobin said he totally disagreed with Mr. Heuston's state-
ment that anastomosis could be as quickly effected with suture as
with Murphy's button. In deep operations, such as those on the
duodenum, suture was very much more difficult than the insertion
of Murphy's button. He agreed with Mr. M'Ardle that it was
the simplest and most successful appliance, and until something
superior was produced he would be very slow to depart from its
use.

Mr. Lentaigne said that under certain circumstances—*i.e.*,
where there was very little time available—the best, and often the
only, chance for the patient lay in the use of Murphy's button. In
gastro-enterostomy, also, he thought it preferable to simple suture,
but he felt satisfied that it was not in all nor even in the majority
of cases the best application. In none of his cases of intestinal
operations had he had trouble after suture, and he did not ex-
perience after operation the uneasy feeling a man would have who
knew that a lump of metal lay in the intestine of a patient already
nearly dead from the absorption of toxins. Another danger con-
nected with the button was that every surgeon, no matter how
incompetent, felt equal with it to an intestinal operation, and many
men now made no effort to learn suturing because they thought
they could do everything necessary with the button. With regard
to cutting through Poupart's ligament in hernia, he had exhibited
to the Section a case in which he had found it necessary to cut
through that ligament, but he did not adopt the elaborate proce-

dure mentioned by Mr. M'Ardle. The wound was plugged with gauze, and at the end of three days sutured from below up in the ordinary way.

Mr. M'Ardle, in reply, said he quite agreed with Mr. Myles as to the comfort to be derived from having a Murphy's button at hand when performing a laparotomy. In the two failures he had had the result could not be attributed to the button, as both patients were moribund, seven feet of intestine being gangrenous in one case and four feet in the other. He could not agree with Mr. Heuston's statement that suturing the intestine in the ordinary way could be carried out as rapidly as by Murphy's button. The fact that incompetent men undertook operation with the button was absolutely no argument against the principle. Next to Murphy's button (which had no place where the intestine was not surrounded by peritoneum) he regarded Halstead's method as the nearest approach to perfection.

REMARKS ON DUPUYTREN'S CONTRACTION OF THE PALMAR FASCIA.

By JOHN KNOTT, M.A., M.D., Ch.B.;
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M.R.C.P.I., M.R.I.A. &c., &c.

[Read in the Section of Surgery, March 30, 1900.]

My attention was specially drawn to this peculiar affection during the course of the past year, in which I happened to be called upon to examine some old soldiers with regard to their claims for pension. Five of those men presented themselves in succession in the course of a few weeks, every one of whom displayed the characteristic features of the so-called "Dupuytren's contraction of the palmar fascia." They had all enlisted as privates. None could offer any definite suggestion of an exciting cause, except that one thought that the prolonged holding of the rifle in the right hand might possibly have had some effect towards the production of permanent curvature of the surface of the palm and of some of the fingers. Each and all of those five pensioners testified to suffering—more or less—from rheumatic pains in the joints of some of the limbs, but hardly more in any of the cases than might have been expected from elderly persons who had been a great deal exposed to the vicissitudes of the atmosphere. Two of them, however, bore in some of the joints distinct evidences of the existence of chronic rheumatic arthritis. All of them were of distinctly "neurotic" temperament. All, except perhaps one, appeared to possess a degree of intelligence decidedly above the average. In every one of those cases the contraction first engaged the ring finger of the right hand, and afterwards passed to the little finger of the same

side.   The corresponding fingers of the left hand had after-
wards become affected, but always to a slighter degree.

Since arranging my notes of the five cases already re-
ferred to, another pensioner presented himself bearing the
same peculiar deformity.   An additional feature compli-
cates his case.   He had received a bullet wound in what
he calls the " heel of the hand " of the right side, ex-
actly in the groove between the proximal extremities of
the thenar and hypothenar eminences.   From the resulting
cicatrix, which still presents a round, elevated, fibrous
nodule, hard to the touch, and very tender on pressure,
the process of contraction and development of rigidity
had extended along the palmar fascia, and its terminal slips
to the ring and little fingers.   About a year or so later it
began to develop in the fascia of the left hand, and the
net result presented was almost exactly identical in appear-
ance with that of each of the other cases.   The above-
mentioned were all ex-soldiers of the American Civil War.

Another case which came under my observation some
years ago occurred in the person of an Irish soldier who
had originally enlisted as a private, but was then a
retired Major-General.   His hands presented appearances
which corresponded almost exactly with those of my
American pensioners, or would-be pensioners.   In all of
those cases, as, indeed, in every case of Dupuytren's con-
traction that I have noted, the process commenced on the
right side.   In every case noted by me, with a single
exception, the contraction was observed to engage the
ring finger first, and the little finger afterwards.   The
fingers of the left hand became affected in corresponding
order; and, in all of the cases to which I have hitherto re-
ferred, were contracted to a less degree.   The middle was
not more than very slightly engaged in any of those yet
mentioned.

In the single case just alluded to, where the ring finger did *not* take the lead, there had been a deep wound inflicted by a piece of broken glass on the ulnar side of the palm of the right hand. The origin of the process dated from the cicatrisation of that wound; which, from its position, must have involved the longitudinal strands of the palmar fascia passing towards the little finger. The little finger was first and most deeply engaged in this case; and I was greatly interested in observing that when the pathological process came to engage the left hand, as it in time did, *the little finger suffered earliest and most* from the contraction.

Within the past few weeks I have met with a couple of other cases of this condition which presented features of strikingly interesting contrast—one in the person of a very full-blooded and, evidently, very free-living barrister; the other was furnished by an attorney's teetotal factotum, who had officiated as a butler in the earlier years of his manhood. In the former of these two cases there had been a traumatic starting point. The metacarpal bone of the ring finger of the right hand had been fractured near the middle. The process of contraction commenced soon after. The left hand became engaged in turn, the contraction also affecting the ring finger first. In each hand the process advanced more rapidly, and diverged laterally to a greater degree, than in any other case that I had seen. Accordingly, the three inner fingers of each hand are now so far affected that the metacarpo-phalangeal joints are permanently flexed, and, pretty accurately, to a right angle; while the second and third phalanges are held as nearly parallel to the surface of the palm of the hand as parallels are likely to be drawn in human anatomy. The last phalanx remains fully extended in each of the affected digits. The forefinger of each hand is habitually held in

the extended position, but all its joints are perfectly flexible. I may mention in this connection that I have never seen the forefinger more than very slightly involved in Dupuytren's contraction. The thumb I have never found engaged; indeed, it would be rather hard for it to become so, as it receives no appreciable slips from the palmar fascia, and the condition which I am now engaged in considering is, according to my view, a pathological one of the palmar fascia only. If the thumb happens to present a somewhat similar deformity at the same time, my explanation is that the gouty, or rheumatic-gouty, process has produced the appearance, as it undoubtedly does in other joints as well.

I have, of course, from time to time met with other cases of Dupuytren's contraction, but they have all fallen within the limits of the extremes presented by these two latter cases—the exaggerated specimen of the over-nourished barrister which I have just attempted to describe, and that of the unassuming teetotal official of the attorney's sanctum, who was assuredly not the victim of gout, and presented no other well-defined rheumatic lesions; and whose widest range of manual efforts would appear to have been placed between the extraction of corks and the serving of writs. Accordingly, in his case, although the thickened bands of palmar fascia were very evident, the curvature—I use the term curvature advisedly—of the affected fingers was but slight. Otherwise the case was perfectly typical in its origin and progress, beginning with the ring finger of the right side, from which it proceeded to engage the little finger, and, to a slight degree, the middle. The appearances in the left hand corresponded exactly, except that they looked as if somewhat "behind time."

In examining the views expressed by the various recognised surgical authorities on the nature and phenomena

of Dupuytren's contraction, one cannot help being surprised at the remarkable ignorance of the subject which was displayed up to a comparatively recent period. As the condition is known to be fairly common, the surgeons of the former centuries would appear to have displayed little enthusiasm for close research ; and, indeed, even in the present day there are many vague ideas and loose statements on the subject to be found in some of our best-known text-books.

The illustrious French surgeon whose name is so deservedly connected with the lesion does not himself mention an older authority on the subject than Boyer, whose " Traité des Maladies Chirurgicales " (1826) was but a few years older than his own " Leçons Orales " (1832). But the views of Boyer on the nature of the lesion, whose external signs he describes, are very infantile indeed. His short section on the subject opens with the sentence— " Les doigts, et particulièrement les trois derniers, sont sujets à une flexion permanente, involontaire, à laquelle on a donné le nom de contracture, et que quelques auteurs ont appelée en latin *crispatura tendinum*." He proceeds to observe that it is never seen in young subjects, and then goes on to enunciate a blunder which has been often repeated—" La maladie commence ordinairement par le petit doigt ; elle gagne bientôt l'annulaire et quelquefois le doigt du milieu ; mais quoique je l'aie observée un grand nombre de fois, je ne l'ai jamais vue s'étendre au doigt indicateur et au pouce." The latter clause of the sentence is certainly much more accurate than the correlative statements made in many of our present text-books. But the writer's pathological views display an entirely mediæval juvenility of thought :—

" On est porté à croire qu'elle dépend moins de la contraction spasmodique des muscles fléchisseurs que d'une

espèce de desséchement, d'endurcissement, et de rigidité du tendon et de la peau."

On this, as on many other dark places of surgery, the illustrious Dupuytren was the first to shed the fierce light of direct experimental research Not content to accept the semi-metaphysical opinions of his predecessors, he always brought the evidence of his own senses to bear on the obscure objects of his investigation. And the vagueness of the pathology of the subject which I am now considering is well shown in his introductory observations—"On l'a successivement fait dépendre d'une affection rhumatismale, goutteuse, d'une violence extérieure, d'une fracture, d'une cause morbifique qui serait métastasée, comme cela arrive quelquefois à la suite d'inflammations des gaînes des tendons des fléchisseurs, ou d'une espèce d'ankylose ; nous reconnaîtrons bientôt combien ces prétendues causes étaient peu fondées." And we find elsewhere in the report of the same lecture—" Les uns l'ont regardée comme un épaississement et un raccornissement de la peau, ... d'autres l'on fait dépendre d'une affection spasmodique des muscles. . . ."

The writer of this communication has had, in the days of his anatomy, opportunities of dissecting the hands of two subjects of typical specimens of " Dupuytren's contraction." Each was a facsimile of the other ; and the conditions found were so exactly similar to those so well described by Mr. W. Arbuthnot Lane (" Guy's Hospital Reports," Vol XLIII.) that I take the liberty of quoting his description as the best word-picture of the condition that I have met with :—

" The two inner fingers of the right hand of a male subject were semiflexed on the palm, the ring finger being somewhat more so than the little finger.

" On extending them a prominent band appeared, run-

ning from the outer aspect of the first phalanx of the little finger along the palm to the annular ligament. The phalanges of this finger were but slightly flexed on one another.

" In the case of the ring finger, a firm band was seen to bridge across the angle between the first and second phalanges, running from about the base of the first nearly to the head of the second. No ridge appeared in the palm, but the web between the fourth and fifth digits became hard and prominent on extension.

" On removing the skin it was found to be very thin over the fibrous band connecting the phalanges of the ring finger, and to be very intimately united with it so as to require careful dissection to remove it without button-holing it. The subcutaneous tissue was also dense over the band going to the little finger, but there was not the same intimate union with the skin.

" On tracing out the digital nerves of the ring finger they became very ill-defined in the dense fibrous tissue, from which they were dissected with the greatest difficulty. Beyond this point the nerves regained their usual appearance. It was impossible to divide into fasciculi that portion of the nerve which was so intimately blended with the surrounding fibrous tissue.

" On removing this dense subcutaneous tissue there was seen some thickening of the superficial transverse ligament connecting the process of palmar fascia running to the ring finger with that going to the little finger, and this extended into the lowest limit of the web. On removing this the vaginal sheath over the first and second phalanges of the ring finger was seen to have undergone a curious transformation.

" Stretching from the fibrous sheath covering the first phalanx to that covering the second was a dense fibrous

bridle, continuous along the whole of its convexity with the thickened vaginal sheath, and presenting a free, straight margin, which was before seen to have been intimately blended with the skin. The depth of this band was about one-third of an inch. It had no connection with any process of the palmar fascia, nor with any other structure but the vaginal sheath, from which it had evidently arisen.

"It prevented extension of the articulation, but did not interfere with flexion. The tendons of the flexor muscles passed through the sheath without presenting any modification. They had become tight owing to the continual contraction of the part of the flexor muscles with which they were connected, and so opposed extension. On dividing the fibrous band with the vaginal sheaths and the tendons, although I used considerable force, I was not able to extend the joint. This movement was opposed by the contracted and thickened anterior ligament of the joint. On dividing this, and again applying extension, the finger flew into a position of over-extension, and would no longer occupy its normal position or any one intermediate between the one it first occupied and that of over-extension.

"This was seen to be due to the fact that the lateral ligaments had undergone contraction, owing to the prolonged flexed position of the articulation, so that they were made very tight when the finger was straightened. On opening the joint the cartilage over a portion of the anterior surface of the head of the bone was smooth, white, and opaque in appearance; elsewhere it was superficially eroded, transparent, and gelatinous, and the synovial membrane encroached on the cartilaginous margin. On the upper surface of the base of the second phalanx the portion of the cartilaginous surface which had articulated with the

anterior surface of the head of the first phalanx retained its normal appearance, while elsewhere it was modified, as described above. The articulation between the second and third phalanges was quite normal.

" The vaginal sheath of the little finger was quite normal. That process of the palmar fascia which went to the little finger, and more particularly that division of it going to the outer margin of the first phalanx, was thickened.   It was intimately united with the subcutaneous tissue covering it, which had become dense and fibrous.   On dividing it the finger was easily straightened."

In examining the views expressed by the various recent surgical authorities on the intimate nature of Dupuytren's contraction, and the definitions which they have respectively offered for the enlightenment of their readers, I have been especially impressed by the contents of a single sentence which occurs in the short section devoted to this subject in the deservedly popular text-book of Rose and Carless.   The authors of this surgical manual inform us that " pathologically, it is due to a chronic overgrowth and contraction of the fascia, inflammatory in nature, and cirrhotic or sclerosing in type."   And, in the recent " Surgery " published by Mr. Pickering Pick, we are told that " the disease would appear to be inflammatory in its nature, and to consist in the formation of scar tissue, which after its formation undergoes contraction, and so produces the deformity."

That the process is an inflammatory one, and that it is specially associated with the gouty and rheumatic-gouty diatheses, I have no doubt whatever.   My full-blooded legal client, who presents the most advanced specimens of the condition that I have met with, is very decidedly gouty. And my Major-General patient, who lived much more abstemiously, and, consequently, did not give himself so special reasons for development of fibroid inflammations,

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informed me that when dining at mess, or among free-living members of the club profession, he was discomforted by the reflection—permanently present to his mind—that if he indulged in an extra glass of champagne he would be annoyed for two or three days after by an uneasy feeling of heat and tingling pain in the palm of each hand. And in every case which I have examined I have found some evidences of the co-existence of what I would like to call the fibroid diathesis. Where such diathetic tendency is very pronounced the palmar fascia is prone to suffer—as do the valves of the heart in other instances—from having so little chance of rest.

The relationship of the palmar fascia to the overlying skin also contributes to give to this condition some of its peculiar features. Anatomists are familiar with the fact that the separation of the skin from the subjacent " deep fascia " presents special difficulty in the case of the *palm of the hand* and *sole of the foot*, as also in the case of the *scalp*. The skin in these localities is, so to speak, nailed down to the strong fascia beneath by vertical pegs of dense fibrous tissue. This arrangement accounts for the fact that the skin cannot be pinched up in these places; also that the subcutaneous tissue does not become the seat of fatty deposit or of œdematous infiltration to any marked extent. And in the hands which I had an opportunity of examining the inflammatory process had very obviously extended from the palmar fascia along these vertical fibrous bands towards the skin. The cirrhotic process had had the effect of approximating the surfaces of skin and fascia, and the amount of " granular " fat normally found in this situation was reduced to a vanishing quantity. The " glossy skin " overlying the affected fascia bore evidence to the trophic changes in the best-marked of my cases.

The statement of Boyer, already quoted, to the effect

that this contraction is oftenest found to engage first the little finger, is still, I am surprised to see, the expressed opinion of the authors of some of our best-known text-books of surgery. For instance, in the " System of Surgery " edited by Mr. Frederick Treves, F.R.C.S. (Cassell & Company, 1896), we are very definitely informed (Vol. II., p. 29) that "it commences in the little finger, which becomes flexed upon the palm, and gradually extends outwards to the other fingers, and finally to the thumb." More accurate is the statement made in the " System " edited by Messrs. T. Holmes and J. W. Hulke (Longmans, Green & Co. Third Edition. 1883), where we are told (Vol. II., p. 253) that " the ring and little fingers, the middle finger, index, and thumb, are usually affected in frequency and degree in the order in which we have placed them." As already observed, it has been my own unvarying experience that typical cases of Dupuytren's contraction—from which I exclude all cases of purely traumatic origin—are found to engage the ring finger first, and the thumb never. The latter fact is necessitated by the normal anatomical conditions, as the last-named digit receives no slips of the palmar fascia. Accordingly, when the thumb presents some simultaneous " contraction " I would explain its existence simply by the presence of rheumatoid changes of the affected joints. This I have myself also seen.

Why it is that the ring finger is so usually selected for the unenviable distinction of being the starting point of this disease is a question which none of the surgical authorities with which I am acquainted has attempted to answer. And yet the cause is not far to seek. When cicatricial—or cirrhotic—contraction of the palmar fascia sets in, the metacarpo-phalangeal joint of the ring finger is the first to yield to the traction, being the *locus minoris resistentiæ*. Surgeons who are familiar with the anatomy

of the hand understand why it is so. Every commencing student of the pianoforte is, at the very outset, made familiar with the deficient power of extension with which the ring finger has been gifted by nature. It has no special extensor tendon, such as is given to the index and to the little finger; and its range of movement is still further limited by the fact that there are always cross slips on the mid-dorsum of the metacarpus, binding its tendons on either side to those of the middle and little fingers respectively. An interesting collateral illustration of the pathological importance of deficient power of extension is noticed by Dupuytren himself in his observations on the troublesome cicatricial contractions which follow burns. As readers of the "Leçons Orales" are aware, the great French surgeon impressed strongly upon his hearers his belief in the preventability of the resulting deformities. And his great argument is, that although joints are often found permanently *flexed* by a cicatrix on the flexion aspect, nobody had yet observed a joint permanently *extended* by a cicatrix on the opposite side. The greater strength and more frequent action of the flexor muscles always prevented such occurrence; and the very small power of independent extension which nature has conferred upon the ring finger is the simple reason for its yielding so soon to cicatricial flexion.

There are some observations and superstitions connected with the fourth finger which will probably be new to some of my hearers, and, I hope, sufficiently interesting to all to justify a passing notice.

The ancients held the belief that a nerve, or a vein, or an artery, or some ill-defined structure, was traceable from the heart to the little finger. The oldest of all national civilisations of which history furnishes any testimony is that of Egypt; and the priesthood of that very complex

hierarchy paid special attention to the claims of the fourth finger. They anointed it before the altar at their religious services with precious consecrated oils. In the sacred doctrine of numbers, too, this finger occupied a conspicuous position. The perfect number, six, was denoted by holding out the left hand with the fourth finger flexed, while the others were kept extended. The corresponding gesture of the right hand indicated the number six hundred, as each finger of this hand possessed a hundred times the value of the corresponding one of the left side. This method of numeration is alluded to by Solomon in his oft-quoted saying of wisdom : " Length of days is in her right hand, and in her left hand riches and honour." Also, in the observation of Juvenal, respecting the tricentenarian, Nestor :

" —— qui per tot sæcula mortem
Distulit, atque suos jam dextra computat annos."

The conspicuous practice of wearing rings—especially those connected with the nuptial contract—on the fourth finger has also contributed very highly to give it a special position among the digits. That the practice of assigning the dignity of bearing the marriage ring to the fourth finger of the left hand was recognised at an indefinite period before the Christian era is well known to all students of antiquity. Interesting testimony on this subject is to be found in the writings of Alexander ab Alexandro, Aulus Gellius, Macrobius, Pierius, and many others.

The origin of this custom has been a good deal discussed; but there can, I think, be no reasonable doubt that its prevalence really gave birth to the idea that there existed some special anatomical connection between this finger and the cardiac organ.

There is ample testimony in existence, too, that this

groundless notion, like so many other vagaries and super-
stitions of ancient and mediæval times, came to make its
impression upon the theory and practice of the healing art.
We are told that the physicians of ancient days used this
finger specially and solely in mixing up the ingredients of
many of their therapeutic preparations. Also that the heart
was always affected by the presence of a ring upon this
finger—the nature of the influence varying, of course, with
the material of which the ring was composed. Also that
in sudden faintings and "swoundings" this finger was vigor-
ously massaged with a mixture of saffron and gold. Levinus
Lemnius, a physician of pre-eminent reputation in the
early part of the seventeenth century, reports excellent
results from this treatment. He also affirms that this finger
is the last of all to become affected by the phenomena of
gout, and confidently asserts that when it becomes nodose
the life of the owner is drawing rapidly to a close. And
the special treatment recommended by Forestus for the
cure of obstinate epistaxis consisted in the application of
astringents to the fourth finger of the hand of the same
side as the bleeding nostril.

In ancient Greek mythology the custom of wearing of
rings was credited to Prometheus, and the early kings of
Rome are supposed to have worn them. But the rings of the
golden age of each of those famous States were of iron; and
the elder Pliny makes the curious suggestion that it was
when the growth of luxury carried with it the introduction
of golden rings that they were transferred exclusively to
the left hand, so that they could be more easily concealed
from the critical austerity of the vulgar gaze.

That the wearing of rings on the fourth finger of the
left hand was by no means an exclusive practice of anti-
quity is well known. A familiar illustration of this fact is
found in Jeremiah, xxii. 24—"Though Coniah, the son of

Jehoiakim, King of Judah, were the signet upon my right hand, yet would I pluck thee thence." Pliny also observes, in his remarks upon rings, that in the portraits and statues of the gods of Greece and Rome the ring was always worn on the forefinger; and that the Romans themselves, as well as the ancient Gauls and Britons, wore theirs on the middle finger. This was a move towards, at least, a more sheltered position. And I have no doubt that the classical deities wore their rings on the forefingers for the same reason that the "Celestial" aristocrats of the present day refrain from paring their nails—simply to show that they (did or) do not require to employ their hands for any useful function.

There is no doubt whatever on my mind that the rings were transferred to the left hand, and its fourth finger, for "conveniency and preservation." Macrobius tells us that rings were at first worn on either hand, and on any finger; but that as luxury increased, and gems were added, with delicately-traced engravings and other easily injured forms of ornamentation, the use of rings was gradually limited to the left hand, simply because it was less used. Also, on this, as on the other hand, the thumb is too active a digit and is usually called into requisition in the exercise of every manual function. The index and little fingers are greatly exposed to every contact, and every application of external violence. The middle finger is a good deal less so; but its size, strength, and dorsal prominence expose it very much to most forms of contact. So that the position of the ring finger is one of comparative shelter and retirement; and satisfactorily explains, I think, why it was chosen for this special function.

To return from this digression. That the pathology of Dupuytren s contraction is that of gouty or rheumatoid disease I have, as already said, no doubt whatever. The fact that there sometimes are no other prominent arthritic

conditions present is no scientific argument against the view. I know one highly-distinguished member of our profession who has suffered—most painfully—from rheumatoid arthritis of the metacarpo-phalangeal joints of the great toes ever since the age of fourteen, yet the disease has never developed to any definite extent in any other part of the body. Baron Dupuytren himself, whose graphic description of this lesion still remains, upon the whole, the best with which I am acquainted, found it developed most frequently in persons so situated in life that the palm was a good deal exposed to pressure and irritation. The coachman who held his whip-handle tightly during a great part of the day, and the scribe who had to seal great numbers of letters and despatches, were among the most prominently-noted victims. When a tendency to fibroid inflammation exists the mechanism can be easily understood. Dr. W. J. Little (in Holmes' "System") tells us that, although he had formerly believed in the gouty or rheumatic origin of the condition, his opinion had been changed by the fact that "the persons affected have appeared singularly free from other manifestations of these conditions." A later sentence tells us that "the symmetrical character of the affection, the precise resemblance of one case with another, the frequent occurrence of the same deformity in father and son for several generations (four), as well as the above facts, confirm the opinion of its constitutional origin." These features appear to me to be most strongly corroborative of the view which I advocate. One of "the above facts" is that "the affection of the palmar fascia, unlike gout or rheumatism, is painless." The instructive case of my Major-General makes an illustrative contrast to this view.

The writer of the article on this subject in Heath's "Dictionary of Surgery" gives pointed expression to the

opinion that the contraction is sometimes partly or wholly due to an affection of the tendon of the *palmaris longus.* Dr. Little, in Holmes' "System," appears to incline to a similar opinion. There is a curious perversion of ingenuity in such exploration of causes. Those who know the anatomy of the hand are aware that the tendon of the palmaris longus, *when present,* is partly adherent to the anterior surface of the anterior annular ligament of the wrist, sometimes entirely so; and that even in the cases in which, as often happens, the greater part of its fibres blend with the palmar fascia, the primary effect of contraction of this muscle (or its tendon) always is to *flex the wrist,* and NOT *the fingers.*

The point on which I feel most inclined to dissent from Baron Dupuytren's luminous and, in the main, accurate description, is with regard to his strong expression of the opinion that the skin was not involved in the pathological process, and that it became quite flexible and healthy in appearance when carefully dissected off the subjacent palmar fascia. The inflammatory changes were distinctly traceable towards the skin in the cases which I dissected, and the conditions so set up in the subcutaneous tissues must necessarily affect the nutrition of the skin itself. The "glossy" condition of the latter I have already noted.

I have myself operated upon two cases only—one was by the "open" method, in which I exposed the diseased fascial slips by making triangular palmar flaps, with their bases opposite the metacarpo-phalangeal articulations, and after division of the contracted slips removed a portion of each, so as to prevent their direct re-union; the other, in which I followed the method recommended by Mr. Adams in his valuable monograph on this subject, and which I regard as by far the most rational form of procedure. The former case did at least as well as I anticipated; but the

necessary extension employed during the healing process had the inevitable effect of leaving cicatricial surfaces of appreciable extent in a very undesirable position.   And, in the second case, the intimate adhesion to the skin, to which sufficient attention is not directed in most of our surgical text-books, prevented satisfactory extension till a very considerable number of punctures had been made.   Also the very great thickening which the normally slight prolongations of the fascial slips along the sides of the first and second phalanges will be found to present in well-marked cases demands the fullest recognition.   These slips always require careful and complete division close to the first interphalangeal joint; and, perhaps, on each side of it, above and below.

From my observations of Dupuytren's contraction, and my study of its conditions, I have been led to consider the hand in which it has become well established as capable of very beneficial treatment, but not of what can, or should, be called a "perfect cure."   And the immediate and "lasting" cure which we are told is now so often effected by Köcher's radical operation of *extirpation* of the affected palmar fascia through longitudinal incisions, I regard as one of the ponderous jokes which writers of surgical manuals insert at intervals within their text, presumably for the purpose of relieving the weary monotony of scientific reading.

I consider it to be my duty to confess—after expressing so strongly my view of the pathology of the lesion—that although I am aware that the microbe of rheumatic gout has been discovered, described, cultivated, and photographed, I have not sought for its presence in any of my cases of Dupuytren's Contraction.

Mr. E. H. Bennett remarked that he had the condition developed in his right hand, and it was beginning to develop in the left also.

He coul I appreciate the justice of the remark that it commences in the ring finger. Being a racket player he might attribute it to the irritation of the butt-end of the racket, but this explanation would not apply to the left side, and its symmetrical development, therefore, puzzled him. He had dissected many preparations, but could discover no satisfactory explanation of its causation.

Mr. Lentaigne spoke.

Mr. Heuston asked if there was any truth in the statement that if the condition was bilateral it was invariably gouty or rheumatic, whereas if one-sided it was usually traumatic. He remembered that in the old text-books a cause given was walking with a round-headed stick. Amongst men that count money this contraction was very common on the right side but not on the left. He had to operate recently on a few cases occurring in cyclists, and the only cause he could give there was the vibration of the handle continually held in the palm of the hand.

Mr. Knott, in reply, said that typical cases of Dupuytren's contraction, from which he excluded those of traumatic origin, were, he believed, nearly always of the nature of rheumatic gout, which was one of the most symmetrical of diseases.

GOÎTRE REMOVED BY THE AID OF LOCAL ANÆSTHESIA BY COCAÏN.

By JOHN LENTAIGNE, F.R.C.S.;
Surgeon to the Mater Misericordiæ Hospital.

[Read in the Section of Surgery, January 19, 1900.]

MR. JOHN LENTAIGNE exhibited a patient from whom he had removed the greater portion of a very large goître on September 4th, 1899. The case was of interest, inasmuch as the operation had been done entirely under local anæsthesia by cocaïn. It was well known that Professor Köcher habitually used this method with success in cases of severe goître, but he was not aware that, so far, anyone in Ireland had done so, and he thought the case might be of some interest. The result had been in every way most satisfactory. The Patient, J. P., aged twenty, had been admitted to the Mater Misericordiæ Hospital on August 29th suffering from a huge goître, which consisted of three lobes—a very large right lobe, a large middle lobe, and a comparatively small left lobe. The patient was suffering from severe and constant dyspnœa aggravated by any exertion, and it was on account of this dyspnœa that Mr. Lentaigne felt himself bound to attempt removal of the growth by means of local anæsthesia, instead of employing ether or chloroform, either of which would in such a case add considerably to the danger of the operation. He was glad to say that during the entire operation immunity from pain was enjoyed by the patient, who showed no discomfort of any kind, except for a moment, when the upper horn of the growth, which burrowed deeply under the larynx, was being extracted. Very little blood was lost, as the vessels

were tied before being cut.   The goître proved to be of the
colloid variety.   The left lobe of the goître, which had been
left, had shrunk since the operation to such an extent as to
be now barely noticeable, and the patient was in excellent
health and condition.   The incision employed was the collar
incision recommended by Professor Köcher.

LIGATION OF SUBCLAVIAN ARTERY FOR AXILLARY ANEURYSM.

By FRANCIS T. HEUSTON, M.D., F.R.C.S.;
Senior Surgeon to the Adelaide Hospital.

[Read in the Section of Surgery, January 19, 1900.]

Mr. Francis T. Heuston brought forward a man for whom he had ligatured the left subclavian artery, in its third stage, for traumatic subclavio-axillary aneurysm, four years since.

At the time of operation the patient was fifty years of age, and had been 20 years in the army. He was admitted to the Adelaide Hospital in February, 1896, suffering from severe pain in his shoulder, left arm, and back, which was then continuous, although it had been for some time at first intermittent. The superficial veins of the left arm were tortuous, the arm being also swollen and œdematous. The clavicle was raised by a tumour occupying the supraclavicular and infraclavicular regions, presenting a well-marked *bruit*, distensile pulsation and thrill. There was well-marked difference of the pulse in the right and left arms. The artery was ligated by catgut applied close to the outer side of the scalenus anticus muscle, the patient leaving hospital 23 days after operation, and resumed his ordinary occupation, which he had filled since without any return of symptoms.

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Mr. Myles asked was Mr. Heuston able to feel carefully the condition of the artery on the cardiac side of the aneurysm before applying the ligature, and was the artery capable of carrying the ligature with safety. He (Mr. Myles) had understood that the aneurysm involved the third stage of the subclavian artery to a

considerable extent. Did he draw the ligature sufficiently tight to break the inner and middle coats, or to destroy the circulation?

Mr. Croly asked if Mr. Heuston had any difficulty with the lower cord of the brachial plexus or with the external jugular vein. Why did he select catgut in preference to ligatures such as ox peritoneum, which do not become absorbed too rapidly? Was the subclavian vein seen?

Dr. Martin asked if the two forms of pain had been noted in the case—the heavy, dull, boring pain, and the sharp and stinging pain.

Mr. Lentaigne asked why Mr. Heuston called it a traumatic aneurysm, the blow having been received two years before its appearance.

Dr. Knott asked if Mr. Heuston had attempted to discover whether the back of the clavicle were eroded.

Mr. Heuston, in reply, said he was able to feel the artery at the outer border of the sterno-mastoid. At the commencement of the operation he expected he would have to tie the artery in the second stage, or even at the inner edge of the scalenus anticus, but he found its coat good, the only thing that looked like disease being that the sheath was more adherent to it than usual, and evidently thickened slightly. He tied the ligature with sufficient force to rupture the inner and middle coats. The lower cord of the brachial plexus gave no trouble, and he was able to shove the external jugular vein out of his way. He used catgut because it was the first aseptic absorbable material he could get. The double pains existed to a certain extent. At first the pain was interrupted and afterwards continuous, with paroxysmal severe pain. He had not examined the back of the clavicle. He considered he was justified in regarding the aneurysm as traumatic, owing to the history of a severe injury to the shoulder about two years before the patient presented well-marked symptoms of aneurysm, and the healthy condition of the coats of the artery close to the aneurysm, as shown at the time of the operation.

EXTENSIVE TUBERCULAR DISEASE OF OLD STANDING, INVOLVING THE ANKLE-JOINT AND FOOT.

By JOHN LENTAIGNE, F.R.C.S;
Surgeon to the Mater Misericordiæ Hospital.

MR. JOHN LENTAIGNE exhibited a case in which extensive tubercular disease of old standing, involving the ankle-joint and foot, with caries of the os calcis, astragalus and lower end of the tibia and fibula, with numerous septic sinuses, had apparently been cured by a thorough scraping with Volkmann's spoon, followed by disinfection with chloride of zinc and absolute phenol. This operation had been performed four months previously, when the patient was in a very bad condition, much wasted, and suffering greatly from pain. Since then the limb had been kept in plaster of Paris, and the improvement in the patient's condition had been continuous and uninterrupted. The temperature had fallen to normal at once, and remained normal. The girl was now, as everyone could see, fat and strong, and she believed herself to be cured. The plaster of Paris had only been removed the day before, and consequently the girl walked stiffly and with a limp. The scraping operation had been done without much hope of a cure. It was intended as a cleansing procedure preliminary to amputation or osteoplastic resection of the foot, but the result had been so very satisfactory that Mr. Lentaigne had thought it worth while to exhibit the case. At the operation the bones mentioned were found to be extremely soft, and much debris was removed; nearly the whole of the astragalus had come away.

Mr. Swan said he had seen a great deal of tubercular disease of the ankle, and he felt very doubtful of successful treatment. The anatomical arrangement of the joint made it very difficult to know when all diseased material was removed. The case was undoubtedly very much improved by the treatment, but he should like to see it at the end of twelve months.

Mr. Bennett said he could not regard the joint as healthy, because its temperature was above normal. A point, however, in favour of recovery was that the sinuses had all healed.

Dr. Kennan said he was struck with the extraordinarily rapid and ready way in which the second septic infection was controlled after the procedure adopted, and he thought the joint was now in a position to get well of itself.

AXILLARY ANEURYSM CURED BY LIGATURE OF THE THIRD STAGE OF THE SUBCLAVIAN ARTERY.

By FRANCIS T. HEUSTON, M.D., F.R.C.S.;
Senior Surgeon to the Adelaide Hospital.

MR. FRANCIS T. HEUSTON stated that, having shown a case of traumatic aneurysm, subclavio-axillary, cured by ligature of the left subclavian artery in its third stage, at the last clinical meeting of the Surgical Section, he thought it would be of interest to exhibit a case of idiopathic axillary aneurysm caused by ligature of the right subclavian artery in its third stage.

The patient, a car-driver, aged forty-three, was admitted into the Adelaide Hospital on January 2nd, 1900. In June, 1898, he felt a pain of constant character in his right shoulder, which, with swelling of his arm, caused him to apply for relief at a hospital in this city, where his case was diagnosticated as axillary aneurysm. He was admitted in November, 1898, and was treated by instrumental pressure until March, 1899, when he left, somewhat relieved, to resume his work, but, finding the exposure incidental to his employment was giving rise to swelling of his hand and arm, with increased pain, he presented himself for treatment at the Adelaide Hospital. On admission, Mr. Heuston found the patient a strong, muscular, well-nourished man. Immediately beneath his right clavicle a considerable swelling existed, which occupied this region to the lower border of the great pectoral muscle. This tumour had a well-marked distensile pulsation, and on palpation gave the sensation as if a very thin wall existed; in fact, it felt as if it must soon burst. On auscultation, a

well-marked *bruit* was present. On pressure on the shoulder the *bruit* and pulsation stopped, as did also the radial pulse. On January 11th, 1900, he ligatured the right subclavian artery in its third stage by the usual incision parallel to the clavicle. Considerable enlargement of deep veins and the presence of the lower cord of the brachial plexus in front of the artery gave some trouble in passing the ligature. When the artery was exposed, its coats were found to be remarkably attenuated, so much so as to feel more like the coats of a vein than an artery. Owing to this condition the ligature (strong catgut) was only drawn sufficiently tight to occlude the lumen of the artery, as Mr. Heuston feared its cutting through if pressure was applied. After the operation the progress to recovery was uninterrupted, the wound healing by first intention. The patient left the hospital on January 31st, 20 days after operation.

On examining the patient now, some 12 weeks after the operation, a solid tumour would be found in the axilla without *bruit* or pulsation. It would also be noticed that no radial pulse exists in the right arm; no swelling or œdema of the hand or arm is present. The patient had perfect use of his arm, and said he had had no pain since the operation; so it might be claimed that his aneurysm was cured.

September 17th, 1900.—I have seen this patient frequently since operation. He is following his employment as a car-driver, and has no evidence of his affection returning.

Bennett said the sounds audible in the tumour were of such that if heard behind the sternum the question would at .ise whether the man had not aortic aneurysm.

Dr. Doyle said he felt what he thought was pulsation in the tumour. He did not hear any murmur. He believed the impulse was not in the tumour itself, but came from some of the vessels behind it which had undergone compensatory enlargement.

Mr. LENTAIGNE congratulated Mr. Heuston on the result obtained. He could hear no heart sounds or murmur of any kind over the tumour.

Dr. KNOTT asked if the man was suffering now, or had suffered previously, from albuminuria?

Dr. GOULDING asked if there was a history of syphilis in the case?

Dr. TRAVERS SMITH said he could not hear the heart sounds over the tumour. On listening towards the edge the pulsation of the carotid could be heard.

Mr. JOHNSTON asked what was the thickness of the catgut used, and was more than a single strand employed? He was glad Mr. Heuston approved of simply approximating the coats of the artery.

Mr. HEUSTON, in reply, said he was unable to detect any sound over the tumour. As to the condition of the kidneys before operation, the urine was found to be of sp. gr. 1026, acid reaction, no albumen, no sugar, or deposit. There was no history of syphilis. The catgut used was the thickest variety ordinarily employed in hospital operations. He did not rupture the internal and middle coats because the wall of the artery was too thin. Although it was now laid down that there was no necessity to rupture these coats, still he felt easier in his own mind by rupturing them where admissible.

THE OPERATIVE TREATMENT OF CLEFT PALATE BY A NEW PROCEDURE.

By EDWARD H. TAYLOR, M.D., B.Ch. (Univ. Dub.), F.R.C.S.;

Surgeon to Sir Patrick Dun's Hospital;
University Examiner in Anatomy, Trinity College, Dublin.

THE successful treatment of cleft palate by operative measures may be regarded as one of the most brilliant achievements of plastic surgery. Many ingenious devices have been planned for rectifying this form of congenital defect and for overcoming the difficulties attending the operation, as a glance into one of our standard text-books on surgery will show. The instruments recommended are legion, but my experience of them leads me to the belief that their efficiency is for the most part in the inverse ratio to their numbers, and, furthermore, I am quite convinced that the operative treatment of cleft palate is needlessly complicated by their employment; the procedures, also, for closing the cleft are not, to my mind, all that could be desired. The following method, which I have devised and carried out in my recent cases, has pleased me so well, and has so fully come up to my expectations, that I decided to bring it under the notice of this Section of the Academy.

It is applicable to those cases especially in which the cleft is complete, reaching the alveolar margin in front. The difficulties attending the treatment of such cases are usually very great, more particularly when the cleft in the hard palate is very wide, and when the soft palate is merely represented by weakly developed folds attached laterally to the pharyngeal wall.

There are certain facts which it is essential to bear in mind in connection with cleft palate operations. In the first place, the main artery distributed to the hard palate reaches it at its posterior part, having emerged from the posterior palatine foramen at the inner side of and somewhat behind the alveolus of the last molar tooth. In the palate this vessel takes a curved course close to the alveolar process, and its principal offshoots proceed from its inner concave border towards the cleft; it is deeply placed too, lying in immediate contact with the periosteum (Fig. 1).

Fig. 1.

Secondly, the soft tissues which cover the hard palate—viz., mucous membrane, glands, and periosteum—are fused together in the closest manner, resembling in this respect the three outer layers of the scalp; it is not possible, therefore, to separate them from each other as definite layers.

Thirdly, there is a considerable depth between the anterior extremity of the cleft in those cases where it terminates behind the alveolar border and the free edges of the incisor teeth.   This is especially noticeable in highly arched palates, and it explains the great difficulty encountered in closing this portion of the gap by any of the procedures commonly practised.   The full appreciation of these facts has led me to devise and carry out the operation which I am about to describe.

OPERATION.

The patient is placed on a low table, the head well thrown back, and the vertex looking directly downwards—Rose's position—and chloroform is administered.   Smith's gag is then introduced into the mouth, and the edges of the cleft pared freely.   The blood which quickly fills the mouth is
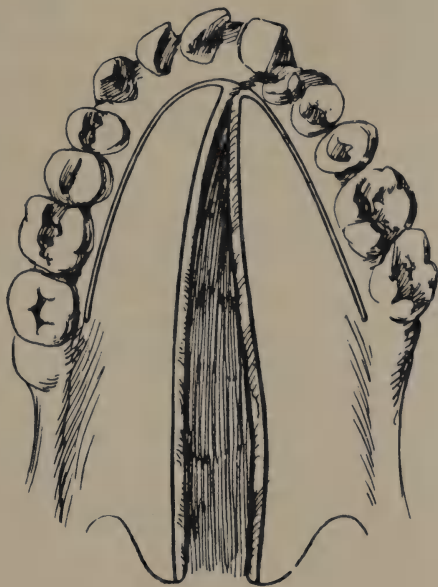
Fig. 2.

removed by means of a suction apparatus, somewhat similar
to that recommended by Mr. Robert H. Woods, in con-
nection with extirpation of the larynx [a] (Plate I.). Through-
out the operation sponges are dispensed with as far as
possible, pressure with the finger on the bleeding point
proving sufficient. A curved incision is now made on each
side close to the alveolar margin of the palate, commencing
posteriorly inside the last molar tooth, and curving round
anteriorly to terminate in the cleft, and arranged at the
same time in such a way that sufficient tissue is left imme-
diately behind the incisor teeth to hold a suture subsequently.
With this incision the posterior palatine artery is retained in
the flap (Fig. 2). The latter is reflected by means of a
rugine (Fig. 5), an instrument which enables one to lift the
muco-periosteal flaps very rapidly and without laceration or
serious damage. I regard the various forms of raspatory
used for detaching the soft tissues from the palate quite
unsuited for the purpose. Some are very narrow, with
sharp-pointed tips, and consequently are in the highest
degree calculated to damage the tissues which they are
meant to detach. The rugine, on the other hand, which I
employ has a fairly broad anterior extremity, and the incli-
nation of its free edge is very abrupt, forming an angle of
about 60° with the horizontal. It is therefore in no sense of
the term a cutting instrument; but, while it ensures the
minimum of damage to the palate tissues, it separates the
flaps with the utmost facility. I would lay stress on this
point, since it is a recognised essential in plastic surgery that
all flaps of tissue should be separated with as little damage
as possible, and should have their blood-supply assured. I
hold that both these conditions are fulfilled in the method I
have described. The next step in the operation is to sever

[a] "Excision of Right Half of Larynx" by Mr. R. H. Woods. Transactions
of Academy. Vol. XIV. 1896.

Mr. E. H. Taylor on the Operative Treatment of Cleft Palate.

PLATE I.
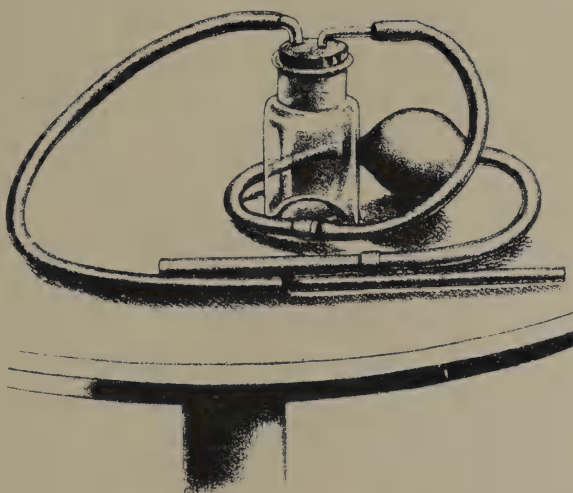
Mr. R. H. Woods' Suction Apparatus.

the connections between the hard and soft palate on their
nasal aspects. This step is much facilitated by turning back
the flaps which have been already detached from the hard
palate, and a knife or curved scissors may be employed for
the purpose.

A word here about hæmorrhage. In all cases it is to be
avoided as much as possible. Loss of blood is badly borne
by young children, and may be followed by serious conse-
quences. Free hæmorrhage, too, floods the mouth, and
greatly obscures the confined field of operation. It can be
obviated best, to my mind, by making the incisions as I have
recommended; and when the flaps are being separated any
undue bleeding may be easily controlled by pressing these
firmly against the bony palate and waiting for a few seconds.
Therefore I would advise against too great haste at this
stage of the operation, and that blood and saliva be removed

Fig. 3.

from the mouth by means of suction rather than by vigorous sponging.

I usually employ silkworm-gut sutures. In introducing them it will probably be most convenient to commence behind and come forwards. Small *curved needles passed with a needle holder* may be used ; but, if preferred, a curved needle in a handle may be substituted for them. It is very striking to observe the facility afforded by the mobility of the flaps in carrying out this stage of the operation. At the anterior extremity of the cleft the suture should be passed through the flap from its mucous to its periosteal aspect (Fig. 3) ; the free end of the suture is then carried through the gum, behind the incisor teeth in the reversed direction—viz., from its deep to its superficial aspect. This suture anchors the flap in front during the process of healing. Should it be deemed insufficient *an accessory suture*

Fig 4.

passed further out on each side will afford ample security. Difficulty may be experienced in bringing the flaps into apposition at the level of the hard and soft palate, and seeing how unfavourable a high degree of tension is for securing good and rapid union it will be well, following the advice of Diffenbach, to make an antero-posterior incision in each side, about half an inch in length, at the inner side of the hamular process. These incisions, in addition to relieving tension, secure rest for the palate, owing to the division of

Fig. 5.

the fibres of the levator and tensor palati muscles ; and any harmful traction influence which these might exert is therefore obviated.

In conclusion, let me summarise the chief advantages of the operation I have just detailed :—

1. It can be performed with greater ease and rapidity than any of the cleft palate operations with which I am acquainted.

2. It is not accompanied by troublesome hæmorrhage, as no large arterial branch is divided, and whatever hæmorrhage does occur may be effectually controlled by digital pressure.

3. The muco-periosteal flaps have their blood-supply assured. They are raised with the least possible damage ; and this is a material advantage when dealing with the delicate and friable tissues of young children.

4. The free range of mobility of the flaps facilitates in a very marked way the introduction of the sutures ; more especially is this the case at the anterior extremity of the cleft, which has hitherto been a difficult part to close.

5. Lastly, the operation is well adapted to young children. One of the main difficulties with them is the carrying out of the post-operatory details. A skilled nurse can do a great deal to promote a favourable result, and a few days before operation spent in making friends with the little patient will have a telling effect on the subsequent course of events.

Mr. E. H. BENNETT disagreed on the subject of the Davies-Colley operation, which he found generally successful, though, of course, every operation was liable to partial failures. He had succeeded with this operation where the ordinary Langenbeck's operation could not be done. The real advantage in Langenbeck's procedure was that he lifted the periosteum and the vessels with it, just as in the scalp they took the arteries with the flap. He had performed a good many Langenbeck operations, but he had never seen bone replaced in the cleft, but he had always got good fibrous tissue. He never had the flaps slough in a cleft palate operation.

Mr. G. JAMESON JOHNSTON said that is was at once the most scientific and the simplest of the operations hitherto devised. He agreed in the condemnation of the Davies-Colley operation, and the other operations appeared unnecessarily complicated. There was one point he wished to refer to—namely, that the flap seemed to depend for its support mainly on the anterior suture, and if by any chance that suture gave, it might be possible that the whole flap might come down. It occurred to him that this might be guarded against by one suture on either side of the palate at a distance from the incision going through the mucous-membrane on the upper surface. The whole secret of success, as had been pointed out, depended on the shifting over of the flap with the vessels, and Mr. Taylor, by keeping close to the alveolar margin, seemed to have done this most successfully.

Mr. LENTAIGNE said he had rarely seen a new operation suggested which seemed to meet the difficulties of the older form as well as this one. He had often spent more time trying to close the front of the cleft than in doing all the rest of the operation. He, also, had never seen a flap in a case of palate operation slough, though he had seen flaps receiving treatment bad enough to make them slough, if sloughing were at all likely to occur. He had no hesita-

tion in saying that he intended to perform this operation in the next case he had, because it seemed to meet exactly the difficulties he had been always confronted with.

Mr. Heuston observed that many surgeons and dentists, among the latter Mr. Theodore Stack, were strongly of the opinion that more could be done with a properly constructed obturator than by surgical procedure. In a great number of cleft, hard, and soft palates there was a great deficiency of tissue with a very high arch, and in such cases he did not see where they could get sufficient tissue to be strong enough to stand the strain of deglutition, &c., during the process of union. He asked at what period of life would it be desirable to perform this operation, because it was held by some that it was utterly useless to operate in a case of cleft palate after the patient had got into a faulty method of articulation. He would also like to know if, after putting in an obturator early in life and getting the patient into proper articulation, it would then be desirable to operate.

Mr. Fitzgibbon regretted, from a surgical point of view, to say that the contention that the adaptation of a properly made obturator was preferable to operation had been justified by a considerable number of cases under his own care. The degrees of deficiency of tissue in cleft palate, however, and the deformity of the palate itself, were points to be borne in mind before advocating surgical interference. The greater the depth of the cleft and the anterior portion of the palate the greater was the difficulty of operation, and the greater was the probability, even if successful, of the patient's voice and power of articulation not being restored by the surgical procedure as efficaciously as by the obturator.

Mr. Taylor, in reply, said he took care in making the incision to leave just sufficient tissue to join the flaps in front, and in case there was not enough tissue in front he would put in a re-inforcing suture in front. He would not hesitate to operate on a child of four or five years, and, if he had his choice, he would select this age, because he was convinced that the speech was never what it ought to be if the operation was postponed for several years. The education of the child afterwards was, in his opinion, a very important point. With regard to the use of obturators, he had not much experience of them, but he looked upon a cleft palate as on any other congenital defect where surgery can rectify the deficiency.

A TRUSS GAUGE OR INSTRUMENT FOR MEASURING FOR TRUSSES.

By THOMAS J. KELLY,

Medical Officer, Enniscorthy.

THE object of this instrument is to supply medical practitioners with a ready means of ascertaining the necessary dimensions for fitting a truss, and to facilitate accurate adjustment of standard hernial trusses; also to furnish every surgeon with an instrument which he can apply to any case of any form of hernia and leave on whilst the permanent appliance selected is being manufactured.
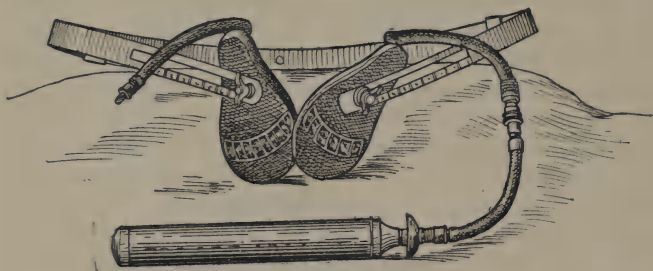
Fig. 1.

This is accomplished by a very simple application of the pneumatic principle to the pads, which are of rubber and inflatable by an injector of standard capacity, so that by recording on the cards supplied the number of strokes of the injector which it takes to fill the pads the exact dimension is ascertained. The body spring of the "gauge truss" is divided into two parts, one sliding over the other and secured by a thumb-screw. On the surface of the body are indexes

engraved, one at each end—one for right and one for left side spring. On the surfaces of the pads are quadrants, also indexed, to give the angle at which the pads are to be set.
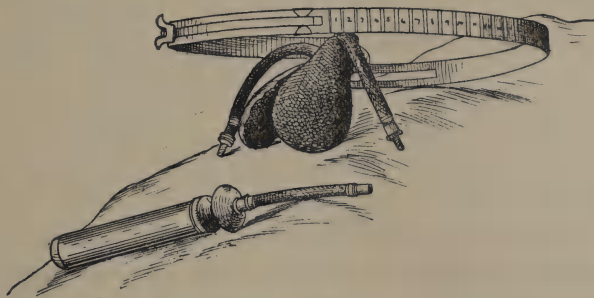
Fig. 2.

Additional terminals are supplied applicable to cases of femoral hernia, umbilical and ventral hernia, and cases of extra large abdomens. In the box with each instrument
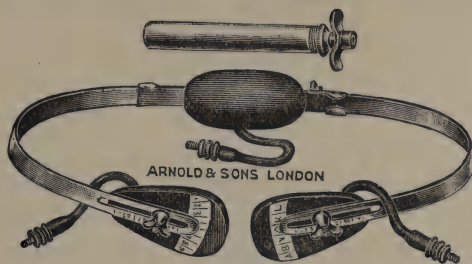
Fig. 3.

there is a stock of cards, on which are printed divisions, with suitable headings, for recording the sizes of the different parts of truss, and these cards when filled can be sent direct to any instrument maker, who, on placing his " gauge truss " in the indicated form, can at once supply an absolutely perfect counterpart truss.

Form of Hernia

Side of Hernia: Right or Left, or Double	Index of Right Spring	Index of Left Spring	Angle of Right Pad	Angle of Left Pad	Number of Strokes of Syringe taken to fill pad		Number of Strokes of Syringe to fill Spring Padding
					Right	Left	
Extra Dimensions							

By dividing an ordinary telegram form into divisions like the card the directions can be supplied to the maker by telegraph, and where telephone is available the communication can be made thus:—Take your "Standard Truss Gauge

Fig. 4.

Card," then one after the other indicate the dimensions to the maker and check them off. Thus it will be seen that every emergency is provided for. The illustrations show the general appearance and arrangement of the instrument.

Fig. 5.

SECTION OF OBSTETRICS.

OBSERVATIONS ON A SUCCESSFUL CASE OF CÆSAREAN SECTION.

By GEORGE COLE-BAKER, M.D. (Dublin Univ.) ;

Ex-Assistant Master Coombe Hospital ;

Ex-University Examiner in Midwifery and Gynæcology to Dublin University.

WHEN I determined to bring a case of Cæsarean section before this Section of the Academy of Medicine I had an idea that the subject was one which had been frequently before it already. On looking over the "Transactions," however, I find my idea was erroneous, as only two papers on Cæsarean section have been read before you—the first by Dr. Macan in January, 1890, when he put on record his first case, which was also the first operation of the kind performed in the Rotunda Hospital; the second by Dr. Kidd in May last. I, therefore, now beg to lay before you some facts in connection with a case of this kind, and trust that they may prove of interest to you, for Cæsarean section is a subject that is of the deepest importance and interest, to all obstetricians, at any rate.

As far as I can ascertain this operation, when performed for the first time upon any given patient has been performed upon women parturient for the first time (I mean at term), or upon women whose previous pregnancies had been terminated by craniotomy and mutilation of their infants; but in my case matters were very different indeed, and in this respect it is, I fancy, unique ; for though it was

O

my maiden effort at the performance of Cæsarean section it was in no way my patient's maiden effort (how could it be ? you will ask) at parturition in any sense of the word, as she was parturient for no less than the eleventh time.   Murdoch Cameron (Glasgow) performed it on a 9-para who had had eight craniotomies.[a]

The history of her previous confinements, as far as I have been able to ascertain it, is as follows :—

1. In Coombe Hospital, 7th March, 1885, the mother being nineteen and a half years old, and only nine months and a fortnight married. The child was delivered alive by forceps after the second stage of labour had lasted eight hours. It weighed 6 lbs. 4 oz., and died in four hours. The placenta was removed manually.

2. In Coombe Hospital, 1st April, 1886 (interval only a trifle over twelve months). Head presented. Conjugate of brim ascertained to be $2\frac{3}{4}$ inches. When the patient had been fifty-six hours in labour forceps were applied, but failed. Version was then performed with very great difficulty, but the after-coming head could not be extracted till perforation and crushing had been resorted to.

3. At own house, on 13th March, 1887, the patient was delivered by a nurse (Mrs. Gunn) of a living female child, which was very small, though the patient thinks she had arrived at full term. This child is still living, and, though small and fragile for her age, seems very smart and intellectual.

4. At own home, on 29th September, 1888, she was delivered (the patient states) with forceps by Dr. S. M. Thompson of a living female infant, still alive and robust in health.   Patient believes she had arrived at term in this case also.

5. At own home, on an unknown date, delivered of a still-born child by forceps by same doctor (the patient states) as in last case.

6. At own home ; date unknown ; child still-born ; had, she believes, come to term ; forgets the details of the confinement.

7. 28th June, 1892, attended at own home by a student of the Coombe Hospital, whose notes are :—" Breech presentation; patient pregnant eight months only ; is supposed to have a small conjugate ; there was no delay in the labour ; the child only lived for twenty minutes."

8. 29th April, 1893 ; attended as in last labour. Notes as follows :—" Born before my arrival ; a male ; alive." This child is still living, and fairly robust. I saw him on the 16th September last, but, as he had measles, merely glanced at him and left his neighbourhood at once.

9. 4th February, 1895 ; attended as in 7 and 8. Notes as follows :—" First stage ten hours ; second stage two hours ; lived twenty minutes only."

10. In the Coombe Hospital on 2nd September, 1897. Forceps tried and failed ; version was performed. After-coming head undelivered at end of two and a half hours ; occiput was then perforated and head crushed and extracted.

Here is, indeed, a remarkable history :—

First, fourth, and fifth pregnancies terminated by forceps. Fifth dead. First died in four hours. Fourth now eleven years old.

Second and tenth pregnancies—Failure of forceps ; version, perforation, and craniotomy of after-coming head.

Third, sixth, seventh, eighth, and ninth terminated naturally—the third and eighth being now respectively thirteen and a half and six and a half years old, the sixth still-born, the seventh and ninth dying twenty minutes after birth.

The eleventh—Cæsarean section. Mother and child are now both well.

I shall not trouble you with the indications laid down in the various text-books for the performance of this operation, as they are given at length by Dr. Macan and Dr. Kidd in their communications already alluded to on this subject.

The special indications upon which I relied were :—(1) The actual facts of the tenth delivery, which were before me ; (2) the patient's story of nine other deliveries, six of which had in one way or another resulted disastrously for the infant ; (3) that the patient had been forty hours—5 p.m. on 8th August to 9 a.m. on 10th August—in labour, had a rising temperature and pulse, with thinning out of the lower uterine

segment, and that the infant's heart-sounds were increasing in frequency; (4) my firm conviction, in which Dr. Smyly supported me, that the woman would not deliver herself, as there were no signs of the head moulding; (5) that my choice lay between craniotomy and Cæsarean section (version, if possible at all, being put out of court by the history of the tenth delivery). (I did not then know about the second delivery.)

Here, too, perhaps I might mention that observations go to show that in the great majority of cases (though it certainly was not so in this case) a woman's second labour is, if I may call it so, the "one of selection," as the conditions are then more favourable for safe and rapid delivery than at any other labour, whilst the tendency is for each succeeding labour after the second to be attended with more and more dystochia as they increase in number.

The details of the case are as follow :—

CASE.—Mrs. C. R., aged thirty-four, was brought into the Coombe by some students of the hospital (who had seen her at her own home) at 9 a.m. on Wednesday, 9th August. She was then in labour, having had pains since 5 p.m. on the previous evening.

In the temporary absence of Dr. Kidd (Master of the Hospital) Dr. Neill (Assistant Master) asked me to look at the patient for him on the date of her admission, and I did so about 12 noon. The patient was then in a good state—pulse and temperature normal, tongue fairly clean, pains occurring regularly, but not very violent; no symptom of impending rupture; taking fair amount of nourishment; fœtal heart normal; membranes ruptured before admission; os dilated only to about size of half-a-crown; head not engaged in brim. I therefore recommended that we should leave the case to nature, at any rate for the present.

No change occurred till 6 a.m. the following morning, when pulse and temperature of mother began to rise, fœtal heart to accelerate, caput commencing to form, retraction ring becoming marked, uterus tightly contracted down on the fœtus, *membranes ruptured for twenty-four hours at least*, if not much longer. Feeling

Mrs. C. R.   Age—Thirty-four.   Operation—Cæsarean Section.   Result—Cure.

Aug. 1899   Sept. 1899.

DATE	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9
DAY OF DISEASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
PULSE M	140	135	120	102	124	112	105	108	108	116	112	112	120	108	108	112	96	100	104	104	104	104	104	88	88	84	88	84	80	88	80
PULSE E	130	104	106	108	100		104	100	104	108	108	126	120	122	102	100	96	108	104	100	100	108	96	90	98	80	76	80	76	
RESP. M																															
RESP. E																															
MOTIONS			4	3	4	3	2	1	4	1	2	4	2	2	1	1	2	1	1		2	2	2		1	1	1		11	11	

Temperature taken at 9 a.m. and 9 p.m.

† Temperature at 6 a.m.; operation at 11 a.m.

that the situation was grave, I asked Dr. Smyly to see her with me, which he very kindly did at 9 a.m. We came to the conclusion that my choice lay between craniotomy and Cæsarean section. I chose the latter, and operated at 11 a.m., Dr. Smyly assisting me.

Of the actual operation I need only say that I incised the uterus before lifting it out through the abdominal wound, and had the ill luck to strike the placental site in doing so, so that for a few moments the hæmorrhage was distinctly "smart." Having increased my uterine incision with scissors I tried to get hold of the child's feet, and after some little delay did so, and extracted the child. There was some difficulty in extracting the head, but I do not think that from the time the uterus was first incised until it was empty was more than 90 seconds. Dr. Smyly now at once controlled the hæmorrhage for me by manual compression.

As soon as the child was extracted the uterus contracted well and permanently, thereby at once expelling the placenta through the incision. I thoroughly wiped out the uterine cavity with sterilised gauze sponges, and then closed the uterine wound with interrupted silk ligatures passed down to, but not including, the uterine mucous membrane. The uterus was then returned to the abdominal cavity, and the latter closed with silkworm-gut sutures. Save that the patient had two severe attacks of diarrhœa, lasting four days each, she made a good recovery, and left the hospital within the month from the day of operation, her temperature never but once rising above 100·8°, and then only to 101·6°. From the day after the operation till she left the hospital she nursed her infant, and, except for the first three days, her milk was the infant's only sustenance.

The infant was asphyxiated when extracted, but, thanks to Dr. Fleming's skilful treatment, was very soon restored, and is to-day (21st November, 1899) as fine an infant as ever I saw for its age. The abdominal sutures were removed on the twelfth day, when union was complete. From the twelfth to the twenty-ninth day there was a purulent discharge from the vagina, which was at first slightly fœtid, so I washed out the uterus each day with creolin solution, and had the vagina douched out as well morning and evening. The patient got up on the twenty-eighth day after the operation, and left hospital on the thirtieth day.

The anæsthetic was given for me by Dr. Hughes, and Dr. Smyly most kindly assisted me, while Drs. Fleming, T. E. Gordon, and Neill also stood by. I thank them one and all very heartily.

The day before the patient left the hospital I measured her pelvis with Skutsch's pelvimeter, and find the c. v. to be 6 cms. (2·4 inches) only. This would seem to tally with Dr. Mason's measurement in April, 1886, the slight discrepancy (·35 of an inch) between his measurement and mine being, I think, accounted for by the greater accuracy with which internal pelvimetry can be carried out at the present day, thanks to Skutsch's pelvimeter; but whether this be so or not, it is evident that the woman's pelvis was contracted to what is known as the 3rd degree—*i.e.*, had a "true conjugate" of between 2 and 3 inches.

It seems hard to believe that a woman with such a pelvis could have living children, per *vias naturales*, and that, too, unaided, as appears to have been the case at her 3rd and 8th labours; but the explanation appears to be in the fact that her 3rd labour occurred in little over 11 months after her 2nd, and her 8th in 10 months to the day after her 7th labour, so it is fair to assume that she had not come to full term at the 3rd and 8th labours. The 4th labour, however, where the patient was delivered with forceps by Dr. Thompson in 1888 of a child that is still alive, did not occur for 18 months after the 3rd, and can not be got over in this way.

I have already stated that I believed my choice in dealing with this case lay between craniotomy and Cæsarean section. As to the former, I can best show my reason for rejecting it by telling you that on the day after the operation one of the nurses (who was an Irish woman, I take it) brought me the infant to look at, with the remark—" Shure, doctor, it would have been murder to kill such a grand child as that." Well, I believe it would, as I do, too, that the immediate risks, at all events, to the mother are every bit as serious where craniotomy is resorted to as when Cæsarean section is performed. But, it may be argued, symphyseotomy was still open to you. I do not admit it. The greatest gain in the

c. v. that can be hoped for is four-fifths of an inch, and that only when the pubic bones have been separated $3\frac{1}{2}$ inches—a dangerous extent. This gain would only have given me a total c. v. of 3·2 inches, and I do not believe a 9 lb. child could have been extracted alive through such a diameter, whilst the mother would have been, to no purpose, subjected to an operation which, in my opinion, is no whit less risky for her in both its immediate and ultimate consequences than is Cæsarean section. Howard Kelly, in his " Operative Gynæcology," makes the statement that—" Where the c. v. is under 7 cms. symphyseotomy is a hazardous operation, unless the child's head is small." The conjugate in my case was only 6 cms., while the child's head was large, as ascertained by palpation. The *British Medical Journal* of Jan. 7th this year has a short note as follows :—

" Charles, in L'Obstetrique, compares Cæsarean section with symphyseotomy—taking into consideration (1) 100 cases of Cæsarean section by Leopold; (2) 90 cases of symphyseotomy by Pinard; (3) his own results with both operations—and his conclusion is, symphyseotomy is *not* less dangerous as is commonly supposed than Cæsarean section." He adds, " At the Dresden Hospital a c. v. of $5\frac{1}{2}$ to $6\frac{1}{2}$ cms. is regarded as an absolute indication for Cæsarean section."

Also, Washburn (*Boston Medical and Surgical Journal*, 30th June, 1898) says :—" With proper asepsis the mortality from Cæsarean section should not exceed 5 per cent. He states, too, that Cæsarean section is a better operation than symphyseotomy—(1) Because it is easier and quicker to do, no special instruments are needed, only soft parts are injured, the field of operation is all in view, and the hæmorrhage is easier to control ; besides, to complete delivery, the forceps is generally needed and lacerations are the result. (2) In Cæsarean section the convalescence is shorter, and there is no fear of a loose pelvis."

Dr. Jardine, of Glasgow, in the *B. M. J.* for May 21, 1898, prefers Cæsarean section to craniotomy.

So much in support of the operation I elected to perform in this case.

At the discussion on Dr. Kidd's paper on this subject in May last, Dr. Smyly told you that every step of the operation, though apparently a simple one, is the subject of controversy. I shall discuss one point only—viz., the suturing of the uterine incision.   The objects to be arrived at if possible are— (1) Speedy and strong union. (2) Freedom from adhesion of the uterus to the abdominal parietes or viscera.   Professor Everke (*Wein. Med. Woch.*, No. 51, 1898), who has performed Sänger's conservative Cæsarean section 25 times with 18 recoveries, five of whom have again become pregnant, speaking of this step—that is, the suture of the uterus—calls it the "essential" feature of the operation, inasmuch as speedy union of the uterine wound is of the first importance as a guard against secondary infection from the uterine cavity. He advocates a "longitudinal" not a "transverse" incision, and three layers of sutures—(1) A deep layer, on which he lays special stress, with the ends brought out *into the uterine cavity and tied there* against the decidua.   How beyond a certain point this is to be accomplished I do not quite see.   (2) A middle and then a more superficial set passed into the muscular coat and tied on the surface of the uterus.   He states that the deep set of sutures ensures a much firmer cicatrix than if they were dispensed with, and this is important in the case of a subsequent pregnancy.   My own opinion is that this deep set of sutures is most desirable, and for them I should use medium (interrupted) silk, including in them a certain amount of muscle as well as decidua to give them a good hold. I should then put in a set of strong interrupted silk sutures, including the *whole* of the muscular wall of the uterus, but muscle only. Finally, I would bring the peritoneum together with a continuous fine

catgut ligature, in such a way as to cover over and completely shut off from the peritoneal cavity all the silk sutures in the muscular wall.

My object in doing so is this, that I fancy such a procedure minimises the possibility of adhesions forming between the uterus and abdominal wall or viscera, which is, as I have already stated, an end desirable of attainment. With every movement of respiration a certain amount of friction takes place between the anterior uterine wall in the puerperal state and the abdominal parietes; and if we have strong silk, or, worse still, silkworm-gut sutures in the uterine incision, this friction must be very much increased by their presence, and quite sufficiently so to irritate the peritoneum, against which they rub, so as to cause sufficient effusion to bring about adhesions. Catgut (and in the form of a continuous suture, as it will have only two knots) will cause less irritation than any other form of suture, and therefore diminish the chances of adhesions. This, I find, is practically what Lebedeff and J. Veit recommend. Winckel says the latter has proven that the peritoneal surfaces often fail to unite.

Another measure to accomplish this end—viz., "drawing down the omentum over the wound in the uterus," as recommended by Marcy (*New York Medical Journal*, July 16, 1898), seems to commend itself; for even if an adhesion with the omentum do supervene, it is not so undesirable as one with the abdominal wall in the light of a subsequent pregnancy. The catgut suture in the peritoneum will, of course, absorb, but it will not absorb before union has taken place, if it is going to take place at all. Dr. Herbert Spencer mentions a danger as the result of Cæsarean section that seems to me to be a very far-fetched one, indeed. He alleges that "the sutures from the uterine wound may work their way into the bladder and there form a nucleus for calculi." I

should be glad to know if this is the experience of any Member of the Academy.

The majority of infants brought into the world by Cæsarean section are more or less asphyxiated, and require to have artificial respiration performed. I believe Schultze's method to be a long way the most efficacious, and by his method many an infant has been saved that I doubt would have been saved in any other way. There are dangers in the process, I admit, many and grave. One—a very real one—you will not find in any text-book that I know of was thus described by a co-examinee of mine when I was a candidate for the L. M. of the Rotunda Hospital. When asked to enumerate the dangers to an infant from Schultze's method he replied, " You might lose your hoult, and it might shlip from you."

However, it has been my good fortune so far never to have any bad results whatever from the proceeding, not even after more than 2 hours of it, as I have performed it myself for that time successfully, and hard work it is, too, with a heavy child.

I omitted to mention that the infant in my case developed unilateral mastitis when eighteen days old. An attempt to abort suppuration was made by applying belladonna and glycerine, but was a failure ; so on the 22nd day I had a bread poultice made with boiling 1 per cent. carbolic acid solution applied continually for 24 hours. When the abscess " pointed," I incised it and squeezed out about an ounce of pus. Lint steeped in boric lotion was applied, and all signs of inflammation had disappeared in four days.

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DR. KIDD said the case he had reported differed in many respects from Dr. Cole-Baker's. His (Dr. Kidd's) operation was performed in a condition where labour was obstructed by a tumour which filled the lower part of the pelvis, while Dr. Baker had operated for deformity of the conjugate diameter. It was a com-

mon misfortune to come down on the placenta, and, of course, if the operator, in his hurry to gain entrance, incised the placenta, it added to the danger of losing the mother and child. The question of putting ligatures through the mucous membrane of the uterus was important. Where a local discharge, which had become septic, afterwards occurred, he thought the passage of these sutures into the cavity of the uterus would be an indirect means to allow this discharge to get between the walls.

Dr. A. V. Macan said that where there had been a long labour the danger of Cæsarean section was very great—in fact, the operation was at times almost contra-indicated. Symphyseotomy was still permissible long after the period for Cæsarean section had gone by. Dr. Baker was to be congratulated on having such a successful result after a twenty-four hours' labour. He looked on the elastic ligature as the great cause of asphyxia. With regard to suturing the uterus, he would use ordinary boiled silk, and rather than lose two seconds over the operation would include the mucous membrane.

Dr. Baker, in reply, said he failed to see that the suture tracks passing through the decidua could in any way conduce more to absorption from the uterus than in the case of any other mucous membrane. The asphyxia of the child was not due to pressure, as none was applied, either with the elastic ligature or by the assistant, until the child had been removed.

SARCOMA-DECIDUO-CELLULARE, OR DECIDUOMA MALIGNUM.

By W. J. SMYLY, M.D., F.R.C.P.I.;
Late Master Rotunda Lying-in Hospital.

On the 16th July, 1888, at a meeting of the Leipzig Obstetrical Society, Professor Sänger made a communication upon " two uncommon cases of abortion," one of which was the first recorded example of the disease which we have now to consider. Since then nearly one hundred cases have been recorded, and a considerable literature has accumulated, from which we have learned that this disease differs sufficiently from all others hitherto described to justify its separate consideration. Observers are almost unanimous as to its connection with pregnancy, its clinical features, pathological appearances, and appropriate treatment; and they differ only in their views as to its origin.

The case reported by Sänger was so typical of the entire group of recorded cases that I think a *résumé* of it will serve as an introduction better than any mere definition.

The patient was a young married woman, aged twenty-three, who aborted at the eighth week in consequence of a fall from a railway carriage. The abortion was incomplete, and hæmorrhage continued for three weeks. In the fourth week the discharge became fœtid, and Sänger was called in. He found the patient very anæmic, with symptoms of septic absorption and putrefaction of the uterine contents. The uterus was thoroughly cleared out, hæmorrhage and discharge ceased, and the temperature became normal; the pulse, however, continued to be over 100°, and recovery was so slow

that she did not leave her bed for five months. Her pro-
tracted convalescence was attributed to a small exudation in
the left parametrium. An enlargement of the uterus was
also observed, but was supposed to be due to subinvolution.
She had not long left her bed when she was obliged to return
to it again in consequence of fever and pains in the right
hypogastrium, where a tumour as large as a goose-egg had
formed in the neighbourhood of the iliac crest. It was soft
and tender, and, being supposed to be an abscess, was incised
but no pus escaped. It consisted of a soft, spongy substance,
of which about a handful was removed, leaving a cavity, at
the bottom of which lay the bare and roughened bone. On
microscopic examination this tissue showed large multi-
neucleated round cells, with spindle cells and numerous
apoplexies. Soon after this operation pulmonary symptoms
set in, with cough and dyspnœa, and she died seven months
from the commencement of her illness.

On *post-mortem* examination the uterus was found to be
infested with dark purple-red, spongy nodules, varying in size
from that of a walnut to that of a large apple. The mucous
membrane was smooth and nowhere perforated by the growths.
Metastases were found in the iliac fossa, lungs, diaphragm,
and ribs. The left lung was compressed by a hæmatothorax.
Microscopic examination of the uterine tumour showed
numerous apoplexies, large nucleated round cells, and cells
resembling decidual giant cells, suggesting the idea that here
was a new growth of the decidua belonging to the group
sarcomata which had never before been described.

Clinical Features.—The clinical features of this disease are
thus summed up by Sänger :—

1. A birth, abortion, or hydatidiform mole, followed by

2. Constant or repeated hæmorrhages ;

3. After this, and generally following an examination or
intrauterine manipulation, putrid discharges with fever ;

4. Increasing size and irregular shape of the uterus;

5. Rapidly progressing and towards the close, intensely marked anæmia;

6. Recognisable metastases, especially in the vagina;

7. Cough, dyspnœa, bloody expectoration, and other symptoms of pulmonary metastases and hæmatothorax;

8. Rapid course of the disease, which usually proves fatal within six to seven months.

The first point of importance is the connection of this disease with pregnancy. In all recorded cases it has come on after an abortion, hydatidiform mole, or, very rarely, after delivery at term. In about half the cases it has followed the expulsion of a hydatidiform mole—a remarkable fact of much importance with regard to its etiology. The second point is hæmorrhage, which either continues after the expulsion of the ovum or commences shortly afterwards. In a few cases it did not occur for a considerable time, and in one recorded by Whitridge Williams it was altogether absent, the first evidence of the disease being metastatic deposits in the vagina and lungs. In the majority of cases, however, it is the most prominent symptom, so that the patient soon becomes profoundly anæmic. The surface is pale and in places slightly œdematous, the face especially assumes a pallid ichteric cachectic appearance.

When the tumour sloughs the discharge becomes offensive, and septic fever sets in. It is, therefore, of the utmost importance to observe the strictest antiseptic precautions in dealing with these cases.

On physical examination the uterus is found enlarged, often irregular in shape, and in some cases the os is sufficiently dilated to admit a finger, in which case the growth may be directly felt.

The course of the disease is one of marked malignancy; in fact it is the most rapidly fatal of all malignant uterine

growths, death occurring from hæmorrhage, septic infection, or pulmonary complications within a few weeks, rarely months, after the first symptoms have been observed.

Pathological Anatomy.—The uterus is usually found infested with new growths, varying in size and colour, but generally of a dark purple-red. They involve the muscular tissue of the uterus, so the peripheral margin is ill defined, and after removal the uterine wall appears thinned. The growth is soft and, where not coloured with blood, of a greyish-red hue ; it closely resembles placental tissue in its irregular fissured surface, its fibrous appearance on section, extreme vascularity, and numerous apoplexies. It is, however, much softer and more friable, and its uterine surface shows a remarkable tendency to slough.

Microscopically these growths are composed of a fibrous reticulum presenting an alveolar and cavernous structure, containing numerous apoplexies, two varieties of cellular elements, and sometimes chorionic villi, but no glands, blood-vessels, or lymphatics. The two varieties of cells contrast remarkably. The one are large individual cells varying from round or polygonal to spindle shape, the nuclei are large, and the outline of their cell protoplasm is clearly defined— they resemble Langhan's cells. The others are protoplasmic masses of various shape, which contain a number of irregularly shaped nuclei, rich in chromatin, but with no line of separation between the cells, and resemble the syncytial layer which forms the superficial covering of the chorionic villi. Both varieties of elements show a marked tendency to retraction of their protoplasm, and vacuolation. Mitotic figures are frequently observed in the cells, but nowhere in the protoplasmic masses.

Diagnosis.—As an early diagnosis is of vital importance, we cannot wait for symptoms to develop themselves, and fortunately it is not difficult, provided careful clinical and micro-

scopic attention be devoted to it. When hæmorrhage occurs after an abortion or molar pregnancy the uterus should always be thoroughly evacuated by the finger and curette, so that one may be certain that everything has been removed and a smooth surface left. If after this hæmorrhage recurs, and a second evacuation reveals a quantity of soft, friable tissue, the case is certainly not one of simple abortion, and is in all probability one of deciduoma. One must, however, be certain that the first curetting was thorough and complete. The size and shape of the uterus varies, but is never below the normal, and enlargement of the organ after discharge of the ovum is of much diagnostic value. The os is often sufficiently open to admit the finger, but may require artificial dilatation. Soft masses of friable material resembling placenta are then discovered, and portions removed by the curette should always be submitted to microscopic examination.

Treatment.—Total extirpation of the uterus is the only method of treatment which has hitherto yielded any benefit, and it is of the utmost importance that this operation should be performed at the earliest possible time before the patient has become exhausted by hæmorrhage, and before putrefaction sets in or metastases have occurred. It must not, however, be regarded as hopeless even under such unfavourable conditions, for cases have been reported by Crobak and Von Fränke where, in spite of evidence of pulmonary embolism, as shown by bloody expectoration and other symptoms, recovery has followed operation. Lönnberg-Mannheimer saw numerous metastases in the cervix, introitus vaginæ and vagina; yet the patient had no return for eighteen months after operation. Cazin found a metastasis in the ovary. Three years after the operation she was well. Schauta extirpated a metastatic growth from the vagina along with the uterus. At the time of publication there had been no return.

Histogenesis.—According to most observers this disease is always connected with and is probably due to pregnancy. The only dissentients from this view were Drs. Eden and Kanthack, who stated at the meeting of the London Obstetrical Society, in the discussion on Dr. Herbert Spencer's case, that the microscopic appearances were in no way peculiar, but similar to those found in sarcomata in other places, and that in some of the cases pregnancy was doubtful. In the discussion which followed Dr. Haultain's communication to the British Gynæcological Society, however, Dr. Eden stated that he was personally in full agreement with the views of J. Veit, in the "Handbuch der Gynækologie," that the disease was a sarcoma modified by the occurrence of pregnancy. We may, therefore, assume as generally accepted that the disease is in some way due to pregnancy. In order to understand the conflicting views as to its origin we must briefly recall the normal condition of the tissues which it affects. The placental villi consist of a stroma covered by two layers of epithelium— an inner called Langhan's layer, composed of individual cells with a distinct cell wall, and an outer formed of protoplasmic masses without any line of demarcation, termed the syncytium. These villi penetrate the decidua serotina and maternal blood-vessels forming the placenta.

Now, the disease which we are considering has been supposed by different observers to originate from each of these structures, and hence the varying nomenclature. Thus, Sänger believes that it originated in the decidua, and he gave it at first the name of deciduoma malignum, but subsequently he preferred to call it sarcoma-deciduo-cellulare because he believed that it originated in the cellular layer of that membrane after it had been altered by pregnancy. Gotschalk believed that it originated, in a case described by him, in the stroma of the villi. Marchand, Gebhard, and Haultain attributed its origin to the epithelium covering the villi,

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and Whitridge Williams to the outer layer or syncytium only, and termed it carcinoma syncytiale, chorion epithelioma, or blastoma-deciduo-chorion-cellulare.

These authorities may, therefore, be divided into those who hold that the disease is a sarcoma, and those who regard it as a carcinoma. Sänger regarded it as a sarcoma of the cellular layer of the decidua because of the similarity of structure in both the size and shape of the cells, and the presence of a reticulum, the only difference being that in the pathological cells the nuclei were larger and the surrounding protoplasmic ring narrower. He rejected Veit's theory that the disease was due to the modification of a pre-existing sarcoma, because no case has been recorded of the implantation of an ovum upon a sarcomatous or carcinomatous endometrium, and he believed that his claim to the growth being different from all others hitherto described stood or fell with its origin during pregnancy. Veit, however, in the newly-published "Handbuch der Gynækologie" still maintains that the sarcoma precedes the pregnancy and is modified by it. He admits that no case has been recorded of the implantation of an ovum upon a carcinomatous endometrium; but in nodular sarcoma the membrane resembles that in myomatous uteri, and that as pregnancy occurs in the one so it may also in the other. He considers that it is impossible to regard all the protoplasmic masses as true syncytium derived from the outer layer of the villi, but rather, as it has been shown, that in normal pregnancy other cells, such as the epithelium of the lining membrane of the uterus, and especially of its glands, often take on a syncytial form, and therefore syncytium in the wider sense cannot be regarded as a distinct tissue, but as a stage in the development of certain cells. So a sarcoma may, under the influence of pregnancy, come to resemble syncytium; and since fœtal elements are not always found in these cases they cannot be regarded as

the chief characteristic, but, as masses resembling syncytium are the rule, the disease should be regarded as a process in which, under the influence of pregnancy, certain cells take on a syncytial character. Hydatidiform moles, so frequently associated with deciduoma, are not the cause but the result of uterine disease, and, regarding deciduoma in a similar manner, the primary disease is to be sought for in the uterus.

In fibro-sarcomata the uterine mucous membrane is in a condition resembling that in myomata, in which prenancy often occurs, and so it may in sarcomata, but under the influence of pregnancy the growth undergoes changes, and its cells assume a syncytial character. Under the influence of the growth pregnancy may be disturbed or ended, a hydatidiform mole develop, or it may go to term. At the birth the entire ovum may be expelled or a villous or villous epithelium retained, grow into the veins, and be carried into the circulation, causing metastases. In either case the tumour goes on growing and leads to a fatal termination. The disease remains the same whether it does or does not contain fœtal elements, the latter being accidental. The essentials are the original uterine disease and the occurrence of pregnancy, under the influence of which the syncytial changes in the growth occur.

Gotschalk, in 1892, described a case in which the stroma of the villi was changed into a structure formed entirely of large polymorphous cells, whose epithelial covering showed a remarkable proliferation. He regarded the disease as a sarcoma, and believed that it originated in the stroma of the villi. This case was the first in which the disease was diagnosticated and the uterus extirpated during the patient's life.

A number of pathologists regard this disease as of epithelial origin, and therefore a carcinoma. Foremost amongst these is Marchand, whose writings have done much to elucidate its pathology, and especially its connection with

hydatidiform mole. In an elaborate paper, beautifully illus-
trated, which he read before the British Gynæcological
Society in June, 1899, Dr. Haultain warmly advocated
Marchand's views, and stated that the chain of evidence in
favour of this new growth being of epithelial origin had to
his mind no weak link. The structural appearances, the
physiological prototype of the young villi, and the interesting
association with myxoma of the chorion, which it closely
resembles anatomically, physiologically, and pathologically,
all serve to prove that it is of epithelial origin.

It would be impossible in the present state of our knowledge
to say which of these views is the correct one, but personally
I am inclined to believe that Veit's views are the least
fanciful and most probably correct.

I shall now report the case which I had the misfortune to
meet with :—

Mrs. G., aged thirty-three, mother of four children, had suffered
for some years from retroversion and metritis. The pregnancy
which ended so unfortunately commenced in February, 1897, and
threatened to end in abortion in April. This was, however,
averted, and the uterus continued to enlarge until August, when it
ceased to do so. I, therefore, came to the conclusion that the fœtus
was dead, but as there were no urgent symptoms, and as the patient
was averse to operative interference, I awaited its natural expul-
sion. But when a month after full term there was no sign of
this taking place I determined to interfere, and accordingly on the
18th of December introduced sea-tangle tents, and the following day,
having completed the dilatation with Hegar's dilators, I evacuated
a hydatidiform mole. The uterus was completely emptied and
scraped with Rheinstädter's spoon. She made a good convalescence,
but her periods soon returned and were profuse. In March, 1898,
when staying with some friends at Monkstown, I was informed
that she had severe hæmorrhage, and I advised her to call in a local
practitioner ; but as she did not do so I concluded that the account
I had received was exaggerated. Shortly after this she called upon
me at my house, and upon examination I found a swelling in
Douglas's pouch which felt like a retroverted fundus ; but upon
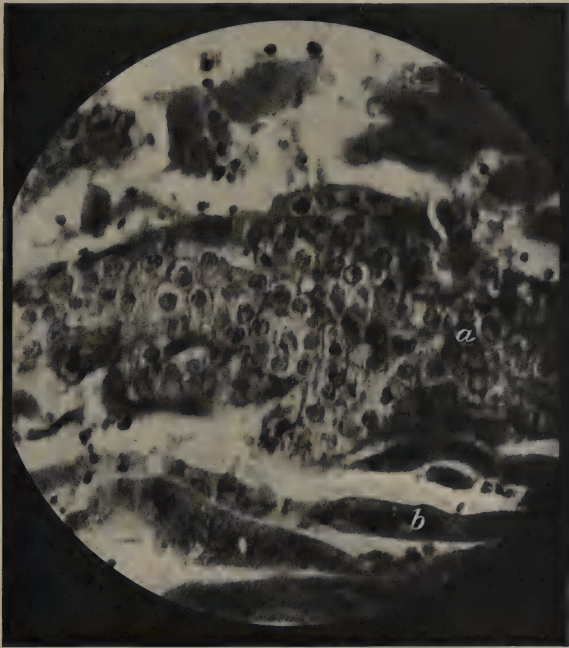
Section from DR. SMYLY's case of Sarcoma-deciduo-cellulare.

a Langhan's Cells.

b Syncytium.

further examination I found the fundus in its normal position. I then supposed that the tumour at the back was an enlarged tube, and considered it to be a contra-indication to intra-uterine interference. She continued to have hæmorrhages after this, and at 10 o'clock p.m. on May 10th her husband called upon me and told me that she had violent pains and hæmorrhage. I at once went out and found her in a condition of intense anæmia ; her bed and a night-chair beside it contained an enormous quantity of blood and clots. She was almost pulseless, cold, and very restless. I immemediately washed out her vagina and uterus with very hot creolin lotion and plugged the vagina with iodoform gauze and cotton wadding moistened with creolin lotion. The Master of the Rotunda Hospital, who had been summoned in the meantime, arrived about midnight, and remained with me about three hours. During this time she had been steadily improving, and as no blood came through the plug we agreed to give her ½ grain of morphia hypodermically and postpone further measures until daylight. At six o'clock, however, violent and agonising expulsive pains set in, which were not relieved by a grain of opium administered by the mouth and ⅓ grain morphia hypodermically. The plug soon became saturated with blood, and a brisk hæmorrhage came through it. The patient became faint, then restless, calling out for air, and refusing local interference. Dr. Purefoy was again summoned, and also Dr. Piel, and in spite of her alarming condition she was ætherised and the plug removed. I now found the os sufficiently dilated to admit two fingers, which at once detected and removed a large quantity of placenta-like tissue. The uterus was thoroughly cleared out by Rheinstädter's flushing curette, but the wall was so thin that during the process I was in constant fear of perforating it. Plugging being for this reason out of the question, and the prevention of further hæmorrhage a matter of vital importance, I washed out the cavity with a dilute solution of perchloride of iron ; the patient was by this time in a very collapsed condition, her limbs cold, and brow bathed with clammy sweat. Having used all ordinary means with little apparent benefit we resolved to infuse saline solution, but by the time the necessary apparatus had been procured she had so far recovered that we considered it unnecessary. During the next few days she improved slowly, but on the third morning the discharge became offensive, and the uterus was washed out with creolin lotion, and as the temperature continued to rise this was repeated daily until the sixth day when I found the organ completely fixed

by parametric inflammation; she complained of intense pelvic pain and vesical irritation. On the tenth day the base of the right lung became solid, with much cough and dyspnœa; an empyema formed on the same side, from which a quantity of stinking pus was subsequently evacuated. The septic fever continued for about two months, when she died. There was no *post-mortem* examination.

It was only at the time of operation that the possibility of the case being one of deciduoma malignum occurred to us, and the diagnosis was confirmed by Dr. Earl's examination of the tissues removed.

The microscopic appearances are well shown in the accompanying photographs which were taken for me by Professor Scott from Dr. Earl's preparations. I showed these specimens at the meeting of the British Medical Association in Edinburgh, and Dr Sänger declared the case to be a typical example of the disease which he had described.

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Dr. Purefoy said he had never felt the tissue of the uterine wall in such a condition of utter degradation and softening as it was in this case. It felt like brown paper. The mole structure removed on the first occasion was of a nature not commonly seen in these cases. He thought it was mixed fleshy and hydatidiform mole. Scattered through it were distinct vesicles, evidence of vesicular degeneration being also present.

Dr. Smith said he was inclined to regard it as an ordinary sarcoma influenced by pregnancy. He knew some eminent pathologists who thought it an ordinary sarcoma. The whole literature of the subject was embodied in Dr. Smyly's excellent paper.

Dr. A. V. Macan said there was one case not mentioned by Dr. Smyly—*i.e.*, Pick's case—in which he found the metastasis of the ordinary hydatid mole not to be malignant. Pick considers that the fœtal structures are only accidental, and they may even form embolisms without being malignant. Opposed to Veit's opinion (with which most people would agree) was that which regarded it as carcinoma of the outer layers of the epithelium covering the villi.

Dr. Smyly, replying, said the point about metastasis in cases

of hydatidiform mole was one of extreme practical importance, because anyone who had not learned otherwise would think that when metastasis occurred the case was hopeless. But the metastasis might not be malignant ; a woman might have benign metastasis in her lungs and recover after operation. Of course, if there were malignant metastases the case would be perfectly hopeless.

A RARE FORM OF ULCERATION IN THE FEMALE URETHRA.

By RICHARD DANCER PUREFOY, M.D. Dub., F.R.C.S.I.;
Master of the Rotunda Hospital;
Obstetrical Surgeon to the Adelaide Hospital.

[Read in the Section of Obstetrics, January 5, 1900.]

THE close resemblance in aspect and clinical history
between some forms of chronic syphilitic disease and
others of a malignant nature has long been recognised—
indeed sometimes the effect of treatment by drugs must be
observed before the differential diagnosis can be safely
established. Especially is this observable in regions where
cutaneous and mucous structures coalesce, and hence the
external female genitals, as might be expected, furnish some
of the best illustrations of this fact. A young woman,
who recently was under treatment in the Gynæcological
Wing of the Rotunda Hospital, complained of pain and
soreness in the vagina, and on examination the following
conditions were observed:—The greater labia were of
normal size and healthy. On the inner surface of the left
nympha a circular excavation existed, the edges sharp-cut
and overhanging, the base white cicatricial tissue. The
entrance of the vaginal canal was closed by a morbid
growth, with nodulated surface of a deep red colour, which,
on close examination, proved to be an outgrowth hanging
from the edge of an enormously dilated urethra; indeed, the
lower third of this passage was so widened and distorted
that considerable difficulty was experienced in passing a
catheter into the bladder. Strange to say, the patient, in
spite of this, did not suffer from incontinence of urine. In

the vestibule and adjoining parts an indolent shallow ulceration was observed, alternating with patches of white cicatricial tissue marking its former course.

In the writings of the late Dr. West I had long ago observed some records of cases so closely if not absolutely identical with the one under consideration that I do not hesitate to quote some of his remarks. He says:—"The affection has come six times under my observation—twice in married women, who acknowledge to having suffered from venereal disease; and four times in women of unchaste life, one of whom was at the time suffering from a secondary syphilitic eruption. In each instance the patient alleged that she had either been aware of the ulceration or had for some time suffered from painful and difficult micturition. Twice the disease was associated with excrescences from the mucous membrane of the urethra. The ulceration appears to begin at the orifice of the urethra, extending thence inwards towards the bladder, producing in its course a great widening of the canal and a patulous condition of its orifice, so that the finger-tip can easily enter it, while the surface is the seat of large, indolent granulations, which secrete a small quantity of muco-purulent fluid, are not generally very tender to touch, but highly sensitive to the passage of urine."

I have met with this ulceration independently of any other disease in these parts, but also in cases where previous ulceration had destroyed the clitoris and the nymphæ, and have seen it associated with unhealthy ulceration about the posterior commissure of the labia and the entrance to the vulva, as also with those small condylomatous growths about the vulva which one often meets with in cases of vascular tumour of the urethra; and these latter, indeed, are far more commonly present than absent. When the disease has advanced far, or has been of long standing, the

cellular tissue beneath the urethra usually becomes considerably thickened, and I have seen the lower wall of it represented by a dense cartilaginous substance, not unlike one of the lips of a hypertrophied and partially procident cervix uteri, while on two occasions I have been able to carry my finger along the whole length of the canal into the bladder. Even when not far advanced this disease causes difficulty in the retention or actual incontinence of urine, while, when it has extended along the whole canal, and left its aperture permanently patulous, the sufferer may be afflicted with complete incontinence. In one such case I have seen, the patient, aged twenty-two, had suffered from the infirmity for many months. She was afforded some slight relief and comfort by wearing a pessary, which, by pressing against the urethra, partly closed it. In another such case the ulcerated canal was so widely open that two fingers could be easily passed into the bladder. In its earlier stages this distressing affection admits of some amelioration by local measures—the application, for instance, of oxide of zinc in the form of ointment, or lotion with liquor plumbi; and, even in the advanced stage, attended with widening of the urethra, the use of strong nitric acid, or the actual cautery, may bring about such cicatrisation and attendant contraction of the diseased parts that control of the bladder may be regained. Some facts in the history of my patient, as well as some scaly patches on the face and neck, afforded such presumptive evidence of a syphilitic taint that I prescribed for her a combination of bichloride of mercury and iron in mixture, and its use was followed by marked improvement, though I cannot be sure of its permanence. In many points these cases bear a close resemblance to that formidable disease of the female genitals first described in 1849 by M. Hugnier, and to which he gave the name "lupus hypertrophicus, or

perforans." This affection is very rare; I have myself only once seen it, and medical literature does not afford records of more than about forty cases in all. In the admirable "Memoirs on Diseases of Women," by Dr. M'Clintock, will be found excellent illustrations of some of them. Whatever views we entertain as to their pathological history, they serve, I think, to enforce the remark with which I began this short communication.

Dr. Smith asked what was the difference between this condition and prolapse of the mucous membrane of the urethra?

Dr. A. V. Macan said he specially asked the question as to whether the orifice of the urethra was in the centre, because the same idea had occurred to him as to Dr. Smith. The ulceration seemed to be very much like the ulceration that took place in prolapse.

Dr. Purefoy, in reply, said that if Dr. Macan and Dr. Smith had seen the case they would not put forward the opinion that it was prolapse. It had no character in common with that condition. Some of the tissue was whitish, and of almost cartilaginous hardness. The outline of the urethral canal was perfectly distinct. The tissue was entirely different from the ordinary mucous lining of the urethra, and was associated and continuous with cicatricial tissue.

CLINICAL REPORT OF THE ROTUNDA LYING-IN HOSPITAL, FOR ONE YEAR, NOVEMBER 1ST, 1898, TO OCTOBER 31ST, 1899.

By R. DANCER PUREFOY, M.D. T.C.D., F.R.C.S.I., (MASTER);

AND

R. P. R. LYLE AND H. C. LLOYD (ASSISTANTS).

[Read in the Section of Obstetrics, February 9, 1900.]

DURING the twelve months comprised in this Report 1,889 women were admitted to the Maternity Department, of whom 1,591 were confined and 298 discharged, not being in labour.   2,163 patients were treated in their own homes.

TABLE No. I.—*Admissions to Maternity Department.*

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
Total deliveries -	105	128	126	110	121	134	138	126	129	149	132	134	1,532
Total abortions -	2	5	2	6	5	6	6	3	3	7	10	4	59
Total cases treated	107	133	128	116	126	140	144	129	132	156	142	138	1,591
Patients dis- charged not in labour - -	5	23	28	19	26	32	36	29	31	18	29	22	298
Total admissions	112	156	156	135	152	172	180	158	163	174	171	160	1,889

TABLE No. II.—*Dispensary for Out-door Patients.*

Number of first attendances,	-	-	-	4,810
,, repeated ,,	-	-	-	5,358
Total,	-	-	-	-	- 10,168

TABLE No. III.—*Showing Nature and Number of Cases Treated in the Extern Maternity,* 1898–99.

Total number of cases - 2,163	Multiple pregnancy, twins—		
	Female - - 9		
Abortions - - - 284	Male - - - 8		
	Male and Female - 14		
Hæmorrhage—			
Accidental - - 5	Operations—		
Placenta prævia - 9	Curetting for abortion 136		
Post-partum - - 25	Forceps - - 24		
	Manual removal of		
Hydramnios - - 7	placenta - - 21		
	Version - - 13		
Eclampsia - - - 1			
	Presentations—		
Fœtal abnormalities —	Breech - - - 47		
Anencephalus - 3	Brow - - - 1		
Hydrocephalus - 3	Face - - - 7		
	Footling - - 4		
Mania - - - 1	Head and arm - 3		
	Occipito-posterior - 12		
Mortality, infantile—	Shoulder - - 2		
Macerated - - 16	Transverse - - 7		
Non-viable - - 7			
Premature - - 11			
Recent - - 52	Prolapse of funis - - 5		
Mortality, maternal - 8	Uterine inversion - - 1		

EXTERN MATERNITY—INTERESTING CASES.

CASE I.—M. F., aged thirty-eight, 7-para. Brow presentation. Labour had continued for many hours, and maternal pulse was 108. Anterior fontanelle was felt lying to the back, and nose and eyeballs readily reacted in front. Podalic version was performed, and a living child delivered. There was some post-partum hæmorrhage.

CASE II.—M. C., aged thirty-five, 8-para. *Placenta prævia centralis.* Pregnancy dated $7\frac{1}{2}$ months. Hæmorrhages for 14 days; os size of a four-shilling piece. Placenta was perforated, version performed, and delivery left to nature. Child was expelled in an hour, dead. Recovery of mother good.

CASE III.—M. C., aged forty, 13-para. *Placenta prævia lateralis.* Internal version easily performed, though most of the liquor amnii had escaped. Delivery left to nature; child $7\frac{1}{2}$ months, born alive. Convalescence good.

CASE IV.—*Inversion of uterus.* R. O'B., aged twenty-seven, 2-para. There was some hæmorrhage following the birth of the child, and the student in charge expressed the placenta, and immediately noticed a dark-coloured tumour protruding from the

vulva. This proved to be the fundus of the completely inverted uterus. The margin of the os externum could be felt above the pelvic brim. Some membranes were peeled off the fundus, and it was replaced by making pressure upwards digitally on the centre of the protruding portion. There was some difficulty on account of the contraction of the internal os, but this gradually dilated, and the fundus could be felt through the abdominal wall bulging through the cervix. Complete reposition took place suddenly immediately afterwards. Contractions were good, and no hæmorrhage occurred throughout. The convalescence was normal.

CASE V.—M. F., aged thirty-nine, 3-para. *Partial inversion produced by midwife pulling vigorously on cord.* Placenta retained $2\frac{1}{2}$ hours, and considerable hæmorrhage had occurred before assistance was sent for. The clinical clerk discovered a partial inversion, which he replaced in removing an adherent placenta.

CASE VI.—*Impacted breech and rupture of vagina.* M. G., aged thirty-six, 12-para. Had difficult labours with all her children, instruments being required on each occasion, and latterly they had become still more difficult. Breech presenting, labour went on with strong pains, and though the cervix dilated and became retracted the presenting part descended only partly into the pelvis, and was there arrested by a prominent ridge running transversely across the middle of the sacrum. Pains were good and patient's condition favourable, so labour was permitted to go on for two hours. She had made no advance by this time and was straining violently, so an attempt was made to deliver the breech by traction with the finger in the groin. Directly a pain forced the presenting part downwards the finger was jammed against the ridge of bone and became powerless. As this failed a catheter was with difficulty passed over the posterior groin, but it was impossible to draw the fillet of gauze back. The open hand was then, with the patient under chloroform, passed gently behind the symphysis, and in doing so a rent was felt in the vaginal wall just outside the cervix. A foot, which rested on the symphysis, was carefully brought down and the breech delivered with difficulty. Further trouble was experienced in bringing the arms down on account of the pelvic deformity, and the head was delivered by Smellie's method, with strong downward pressure on the fundus. The fœtal heart was still beating feebly, but the child could not be resuscitated. On further examination the rent was found to involve half the circumference of the vagina, extending completely through the right lateral fornix.

Through this rent the hand passed into what appeared to be a cavity with some fluid blood in it, and the uterus was felt firmly contracted, distorted somewhat to the left side. This space, which was manifestly inside the broad ligament, was douched out, and packed with iodoform gauze. The puerperium was uneventful. The gauze was gradually removed, the last of it being taken away on the 3rd day, and the patient left her bed on the 12th day in good health. (We refer the reader to a paper on this subject by M'Clintock, *Dublin Quarterly Journal* of May, 1866.)

Case VII.—K. N., aged twenty-four, 2-para. Of interest from the fact that the fœtus, which was macerated and lying transversely, was born by spontaneous evolution. There was a temperature of 104° F. on the 3rd day, which fell to normal on appropriate treatment.

Case VIII.—M. D., aged twenty-six, 4-para. Normal labour and puerperium until 8th day, when patient on getting up had a severe secondary hæmorrhage. When seen pulse could not be felt at wrist, heart beat 130 per minute. She was under the influence of alcohol. The uterus, which was sub-involuted, was curetted and some decidual fragments removed. Recovery good.

Case IX.—C. L., aged thirty, 10-para. *An incomplete abortion at 3½ months.* In curetting this patient (after an unavailing attempt to remove the contents with the finger) the curette, which was not a good shape, perforated the fundus of the uterus. After thorough evacuation of the cavity, it was plugged with iodoform gauze. The patient, who was somewhat collapsed, rallied well and passed through a normal puerperium. The gauze was removed on the 2nd day.

Case X.—A. D., aged twenty-eight, 6-para. Pregnant 6½ months. Considerable post-partum hæmorrhage took place from an extensive erosion. Controlled by hot douche and ergot.

Case XI.—M. K., aged thirty, 4-para. The right labium was exceedingly friable, and infiltrated with malignant disease. There was in it a vessel of considerable size, the bleeding from which was only controlled by a needle and figure-of-eight suture.

Case XII.—M. M., 4-para. Normal labour. Severe secondary hæmorrhage on 10th day on sitting up. Uterus subinvoluted, with cervix patulous. Some shreds of secundines were removed by Rheinstädter's curette.

Case XIII.—K. H., aged forty-seven, 18-para. *Cephalic version.*

Twins; first child delivered, and 1½ hours later hand of second appeared at the vulva, and assistance was sent for. Examination showed that the head was lying in the left iliac fossa and the shoulder in the cervix, and the uterus closely applied to the body of the child, the liquor amnii having completely escaped. The shoulder was gently pushed to the right side under chloroform, the arm replaced, and the head brought over the cervix. Rapid delivery ensued. The placenta was completely detached, and with it a quantity of blood escaped from the uterus. Convalescence was uneventful.

EXTERN MATERNITY—MORTALITY.

CASE I.—M. B., aged thirty-eight, 10-para. *Accidental hæmorrhage.* Had slight pains at 10 a.m., and at 5 p.m. a small quantity of hæmorrhage took place, and was followed at 6 30 p.m. by severe flooding. Assistance was then sent for, but patient died at 7 30, undelivered, soon after arrival of student. She was moribund when first seen. *Post-mortem* examination proved the placenta to be completely detached, and a quantity of free blood was in the uterine cavity. Other organs were healthy.

CASE II.—E. B., aged thirty-five, 5-para. *Air embolism.* This patient, 48 hours in labour, delivered herself of a full time stillborn child. The placenta was retained, and there was considerable hæmorrhage. The pulse was good. She was very violent and resisted treatment. After removal of placenta and membranes and administration of a hot douche the binder was applied, as the uterus was firmly contracted, and she was put back to bed. A few minutes afterwards she suddenly threw herself to the other side of the bed, the respiration ceased, and heart beat could no longer be felt. Artificial respiration was performed for a considerable time without avail. No anæsthetic had been administered.

CASE III.—M. D., aged forty-four, 16-para. *Placenta prævia lateralis.* In this case there was severe hæmorrhage at 5 a.m., and when seen at 8 15 a.m. the patient was pallid and radial pulse hardly perceptible; os admitted four fingers, and vertex presented. The placenta could be felt on the left side about one inch from the os internum. Hæmorrhage was still continuing. Podalic version was performed, and on drawing the foot down hæmorrhage ceased. A tight binder was applied, stimulants and hypodermics of strychnin were administered. She was allowed to rest until 11 a.m. Pains came on fairly strongly and frequently, but con-

siderable difficulty was experienced in the delivery of the child, which was stillborn. Restorative means proved unavailing.[a]

CASE IV.—S. C., aged thirty, 5-para. *Post-partum hæmorrhage.* The placenta was retained for two hours, during which time hæmorrhage was going on before the handy woman in charge sent for assistance. The hæmorrhage had been very profuse, and patient was exceedingly anæmic and pulseless. The placenta was removed manually. The uterus, which refused to contract under hot douches or bimanual massage, was plugged with iodoform gauze. Hypodermics of strychnin and digitalis were given, and brandy by mouth and rectum, with one pint of warm water, but without avail.

CASE V.—J. D., aged forty, 14-para. *Post-partum hæmorrhage.* After eleven hours' labour patient delivered herself; the placenta followed in seven minutes with severe *post-partum* hæmorrhage, which persisted notwithstanding the usual remedies, and patient sank so rapidly that a *post-mortem* examination was made, but nothing found to account for the sudden death.

CASE VI.—M. P., aged twenty-one, 1-para. This woman was delivered after a normal labour lasting only twelve hours On the second day there was a temperature of 104° F., and pulse 140. A uterine douche was given, but patient refused to allow curetting. On the third day Rheinstädter's curette brought away some membranes and blood clot, temperature then being 105° F., and pulse 126. The uterus was plugged with iodoform gauze daily, but there was little improvement, and patient gradually sank and died on the 16th day of sepsis.

CASE VII.—H. S., aged thirty-seven, 3-para; was in the hands of a "midwife," who permitted the placenta to remain *in utero* with hæmorrhage going on from 10 a.m. to 6 p.m., and then sent to the hospital. On arrival the Assistant found that the placenta required manual removal. The woman was blanched and almost pulseless. No hæmorrhage occurred after the third stage was completed. The temperature after she was put back to bed was 99° F., and next day 103·6° F. The uterus was douched and plugged with iodoform gauze, but she died on the third day of septic peritonitis.

CASE VIII.—A. G., 11-para. *Hæmorrhage.* Patient five

[a] We think that in this case it would have been better had more time been allowed for the natural efforts to effect delivery, as is the routine treatment of the hospital.

months pregnant. When first seen, almost exsanguine. The placenta, which was still *in utero* and adherent, was removed with finger and Rheinstädter's curette, and ergot and strychnin were given hypodermically. Hæmorrhage ceased, but patient, who was very collapsed, gradually sank and died six days later.

TABLE No. IV.—*Showing Number and Nature of Cases Treated in the Intern Maternity*, 1898–99.

Total number of cases	- 1,591	Twins—*con.*—		
		Male	-	12
Primiparæ - -	- 529	Male and female	-	11
		Triplets - -	-	1
Abortions - -	- 58			
		Myoma uteri -	-	7
Deformed pelvis -	- 13			
		Operations—		
Eclampsia - -	- 5	Forceps - -	-	66
		Induced abortion	-	4
Epilepsy - -	- 1	Induced labour -	-	6
		Craniotomy -	-	1
Galactorrhœa -	- 1	Manual removal of		
		placenta -	-	20
Hæmorrhage—		Porro's operation	-	1
Accidental -	- 16	Version - -	-	14
Placenta prævia -	- 9			
Post-partum -	- 18	Pathological conditions of		
„ secondary -	- 2	infants—		
		Anencephalus -	-	1
Hæmatoma vulvæ -	- 1	Cephalhæmatoma -	-	4
		Congenital dislocation of		
Hydramnios - -	- 13	knee - -	-	1
		Hydrocephalus -	-	1
Hyperemesis - -	- 2	Imperforate anus -	-	1
		Icterus (during 6 months)		124
Insanity—		Mastitis - -	-	1
Mania - -	- 3	Ophthalmia -	-	9
		Spina bifida and talipes -		10
Inversion of uterus (partial)	1	Hare-lip and cleft palate		2
		Hypospadias -	-	1
Morbidity - -	- 139			
		Physometra and embolism -		1
Moles, hydatid -	- 2			
		Presentations—		
Mortality, maternal -	- 10	Breech - -	-	78
		Brow - -	-	2
Mortality, infantile—		Face - -	-	5
Macerated -	- 30	Footling - -	-	3
Putrid - -	- 1	Hand and head -	-	2
Premature -	- 19	Occipito-posterior -		24
Non-viable -	- 10	Shoulder and transverse		10
Recent - -	- 26			
Died in hospital -	- 30	Prolapse of funis -	-	12
Multiple pregnancy—		Puerperal ulcer -	-	4
Twins—				
Female - -	- 2	Rupture of uterus -	-	2

ABORTIONS.

There were 55 abortions treated during the year. In incomplete abortion, where possible, the contents of the uterus were removed by the finger, and, failing complete evacuation, Rheinstädter's flushing curette was used. This latter treatment was found necessary in 34 of the cases; only one of these requires to be recorded in the Table of Morbidity—in her case one rise of temperature only occurred, and that on the third evening. This case was one of apoplectic ovum.

In ten cases the ovum was removed by the finger; one of these had a temperature of morbidity on the third evening, rising on the fifth to 104·8° F. The rise of temperature was ushered in by a rigor, after which she was curetted and plugged with iodoform gauze daily until normal again.

In six cases the abortion was complete and no treatment was required.

The remaining two cases were vesicular moles, at two and two and a half months respectively. In the latter case the temperature was 103° F. on admission, but fell to normal on evacuating the uterus, which was as large as one of a four months' pregnancy and contained typical hydatid-like bodies.

DEFORMED PELVIS.

Of these thirteen cases, five will be found fully recorded under " Induced Labour," *q.v.* In six delivery was effected by forceps. In one, with conjugate of 7 cm., a living child weighing 7 lbs. was extracted with forceps ; the measurements of its head after delivery corresponded to those of the pelvis. She was 43 hours in labour, and had a normal convalescence.

One patient, a 6-para, with a history of four stillborn

children, followed by an induced labour in the hospital in 1898, which terminated satisfactorily by version, had a conjugate of 8·75 cm. She came from Co. Kerry, and was at full time, with labour just commencing. Her pelvis was generally contracted, the transverse measurement being 10·5 cm. The os dilated fully with head still above the brim; the membranes were, therefore, punctured, and two and a half pints of stained liquor amnii escaped. The head then engaged at the brim, and as the pains were strong and the condition of patient and fœtus good a tight binder was applied. An hour later, however, the patient became suddenly unconscious, pulse scarcely perceptible and extremities cold. Combined version was performed, and the breech delivered with some difficulty. The child was born in asphyxia pallida, but recovered in a remarkably short time. Ether had been administered to the patient during the operation, and the child exhaled the odour of the anæsthetic for fifteen hours.

The second case of version is described fully under " Prolapse of Funis."

In the remaining cases delivery was effected by the natural efforts.

ECLAMPSIA.

Four cases were treated during the year. They are as follows :—

CASE I.—E. L., aged twenty-two, 2-para. Seven months pregnant. Was admitted from the country with lower limbs and vulva enormously œdematous. The right labium had ruptured, and serum was escaping from it. The abdominal walls were also œdematous and pitted readily, and the face was pale and puffy. It was extremely difficult to pass a catheter, and three ounces of thick, dark-coloured urine, of specific gravity of 1015, were withdrawn. Patient was given a steam bath, in which she was kept for half an hour, and pulv. jalap. co. grs. xl. and hydrarg. sub-

chlor. grs. v., the pulv. jalap. being repeated in two hours. A poultice was applied to the loins; tinct. digitalis ℳ x. every four hours, and milk diet. Early next morning mist. sennæ co. ʒii. was given, and was followed by a free evacuation of the bowels. The amount of urine passed steadily increased, and the albumen decreased with a gradual disappearance of the œdematous condition until the sixth night, when she had some vomiting and severe frontal headache, with loss of vision and some incoherence. Hot jars were placed about her and her condition improved somewhat, but the urine went solid on boiling. A steam bath was given and one-sixth grain of morphia. Labour pains were almost imperceptible, but the head was descending sufficiently to cause obliteration of the internal os. Two bougies were passed into the uterus, and one and a half hours later good pains set in. In about six hours she had an eclamptic seizure, lasting five minutes; half a grain of morphia was given. The urine contained pus, tube-casts and squamous epithelium. There was at this time some strabismus of the right eye. Eight hours later she had another fit lasting five minutes, and as the head was on the perineum forceps were applied and delivery effected, the child recovering under treatment. After delivery the patient slept for two hours and woke up perfectly rational. The catheter was passed and 14 ounces of urine withdrawn, and during the succeeding 21 hours 102 ounces were obtained. It contained only a small quantity of albumen. The third day her condition was much improved, and she passed 70 ounces of urine. Her progress continued good until the 6th day, when she had a slight shivering, and the temperature ran up to $102 \cdot 6^\circ$ F., with pulse 156. A uterine douche was given, but nothing could be found to account for the pyrexia. On her 7th day there was a patch of redness on the right buttock, and this gradually extended along the cutaneous surface from the labium, which had ruptured. Next day it was erysipelatous in character, with raised edges and some induration; there were small vesicles over it, and a stinging sensation was felt. The perineum, which had been sutured, remained healthy. On the 11th day all sign of redness had disappeared. Fluid from the vesicles gave cultures of streptococci, which formed only small clumps, and were evidently not very virulent. Some induration was found high up in the broad ligament on the left side, and she had some pain, which was easily relieved by fomentations. The urine contained a large deposit of pus. Next day (12th) the temperature rose to 104° F.

in the evening, and thereafter it gradually fell to normal on the 16th day, and she left hospital soon after.

Case II.—M. F., aged twenty-eight, 1-para. Five months pregnant. A pale, delicate woman, had two " fits " before admission, and one lasting three minutes soon after she came in. The bladder contained 12 ounces of urine, which became solid on boiling. She had only slight œdema of the feet. She was given a steam bath, was freely purged, and kept on milk diet for six days, when she went out of the hospital much improved. This patient returned in four weeks, and delivered herself of a macerated fœtus without any difficulty. The puerperium was normal, and the urine free from albumen.

Case III.—M. F., aged twenty-two, 1-para. Admitted with general anasarca, vomiting, and extreme pallor. Had her bowels freely moved, and was kept on milk diet. The second day, when having feeble labour pains, she had an eclamptic seizure lasting two minutes. The os was then the size of a five-shilling piece, and membranes unruptured. She had a second fit of the same duration in two hours. The urine was scanty, and loaded with albumen. A quarter of a grain of morphia was given, followed by quiet sleep, after which the infant was expelled alive. Convalescence was uneventful.

Case IV.—T. M., aged twenty-three, 1-para. Seven months pregnant. One hour after admission had an eclamptic fit, lasting two minutes. Half a grain of morphia was administered, followed by three-quarter grain doses at suitable intervals. Croton oil was given ; profuse sweating induced by means of the steam bath, repeated twice daily. A second fit occurred one and a half hours after the first. Labour supervened on the third day after admission, lasted one hour, and was terminated by the birth of a dead fœtus, weighing 3lbs. Normal convalescence followed, during which the urine, at first highly albuminous, became healthy.

Case V.—M. R., aged thirty, 1-para. Seven and a half months pregnant ; had some pains during the night, and thinking that labour was coming on walked with her husband some miles into the town, where she took a car and drove to the hospital. On admission she appeared to be in good condition, and was accordingly given the usual warm bath and put to bed. Some hours afterwards she had a fit, not typical of eclampsia, as she

attempted to strike anyone coming near her. It lasted one minute.
No urine had been passed since admission, and the catheter with-
drew 4 ounces of highly blood-stained urine, which became solid on
boiling. Forty minutes later she had another fit, which lasted two
minutes; and as this resembled an eclamptic seizure she was given
half a grain of morphia and a vapour bath. She did not again
become conscious, fits occurring every 45 minutes. Croton oil ℥ iii.
was given without effect, quarter of a grain of morphia in four, and
then two, hours, and steam baths twice repeated. The pupils,
which were pinpoint, dilated widely while the fit lasted, and the
temperature rose to 102·2° F., and later to 106·6° F., with a pulse
of 134. She had in all 13 fits, the longest of which lasted five
minutes, and these gradually became shorter till the last, which
was only 30 seconds, and for three hours before death there were
none. Respiration was 28.

The vaginal examination made during the day showed the os to
be sufficiently dilated to admit a finger, the membranes were unrup-
tured, and the cervix not obliterated. During the afternoon, when
the urine was drawn off, it was thick, and the colour of porter.

Post-mortem.— Uterus studded with small myomata, os size of a
four-shilling piece, and membranes ruptured; the uterine wall was
flaccid; kidneys, normal in size, very much congested. Liver
extremely large, smooth on surface and nutmeg-like, with alternate
patches of yellow and reddish-brown colour. The left lobe was
very large, and extended to the abdominal wall on the left side;
microscopically it showed the usual patches of hæmorrhage having
no connection with any vascular system, accompanied by broken-
down liver cells. Lungs and heart healthy.

As will be seen from the following table we have had a
considerable number more of these cases to treat than in
the previous year; and we regret exceedingly to have to
record a death among the number, but this case does not
influence in any way the value of the special line of treat-
ment advocated and carried out so successfully by this
hospital for some years past. The case follows.

TABLE No. V.—*Accidental Hæmorrhage.*

Name	Date	Age and Para	Variety	Treatment	Child	Remarks
M. F.	Dec. 1	38, xiv.	Mixed -	Binder -	D.	Slight external
M. M.	,, 8	29, vii.	,,	Plug and binder	D.	8 months pregnant
R. C.	,, 22	34, xiii.	,,	Induced abortion	A.	See Notes "Induced Abortion"
M. C.	Jan. 9	31, v.	,,	Plug and binder	D.	7 months pregnant
M.J.C.	Feb. 11	37, ix.	External	Left to nature	A.	Slight, blood in amniotic sac
E. G.	Mar. 9	42, x.	Mixed -	Forceps -	D.	Died; membranes ruptured on admission
S. C.	May 20	30, iv.	,,	Left to nature	D.	In labour; premature
H. M.	,, 12	32, v.	,,	Plug and binder	D.	6 months pregnant, some external
A. R.	Aug. 2	43, ix.	External	Left to nature	D.	Child macerated; pains good
M. R.	,, 10	33, v.	,,	Membranes ruptured	D.	Pains strong; os dilated
E. N.	,, 21	32, vii.	Mixed -	Left to nature	D.	No history; retroplacental clots
E. C.	,, 26	36, xi.	,,	Membranes ruptured	D.	Os dilated; pains good; P.-P. H.
E. D.	,, 29	38, xi.	,,	Plug and binder	D.	Twice plugged
M. L.	Sep. 28	30, ii.	Slight external	Membranes ruptured	A.	In second stage; pains good
M. M.	Oct. 16	38, iii.	External	Left to nature	A.	7 months pregnant; slight
A. S.	,, 28	27, ii.	Mixed	Plug and binder	A.	Slight; uterus hard; pulse 72

CASE VI.—E. G. Had a history of slight hæmorrhage intermitting for three days before admission. Vaginal examination proved that the os was small and the membranes ruptured. Pulse 110 and temperature normal. She was given quin. sulph. grs. v., and a tight abdominal binder applied as pains were feeble. Three hours later restlessness, dyspnœa, and marked rapidity of pulse showed an alarming condition, and the os being fully dilated and head entering the brim, delivery was easily effected by forceps, followed by a large quantity of black blood clot. The placenta, which was large and apoplectic, came away five minutes later. The uterus contained a large

quantity of blood clot and remained dilated enormously, with flaccid walls. A uterine douche was given without result, and as the uterus failed to contract on bimanual massage the cavity was plugged with iodoform gauze and two and a half pints of saline solution introduced into the veins with some improvement, pulse falling to 120. This was only temporary, and the patient sank and died half an hour later.

Of these 16 cases it was found necessary to use the vaginal plug and binder in only 5, and in all of these the patient passed through her puerperium without a sufficient rise of temperature to necessitate recording in the morbidity table, and they all left hospital in good health from the eighth to tenth day. In one (E. D.), though the pulse was fairly strong, there were the usual symptoms of hæmorrhage, occurring without warning, and, as is often the case during sleep, coming in one gush and then ceasing; pale face, hard and enlarged uterus, very tender on palpation, with an absence of fœtal heart sounds. After the tampons had been applied considerable improvement occurred in the patient's condition, and pains soon set in. As the perineum was bulging the plugs were removed. The os was only then sufficiently distended to admit two fingers. Fresh plugs were consequently introduced, and a hypodermic injection of morphia administered. After this the patient had a good sleep, and was fed with nutrient enemata, as she had some vomiting. Eight hours after the introduction of the tampons good pains set in, and plugs, fœtus and placenta, together with a large amount of blood clot, were delivered in an hour. There was no post-partum hæmorrhage.

There were some points of interest in another of these cases (A. S.). The patient (near her full time) was suddenly seized with severe pain while in bed. Two hours later there was some external hæmorrhage, and she sought admission. The os admitted a finger easily; the mem-

branes were unruptured, vertex presenting. The patient's aspect was good and pulse 74, and the fœtal heart could be readily heard; but the uterus on palpation was terse and bulging towards one side. There were no pains, and no hæmorrhage was seen after admission. The vagina was tamponed, an abdominal binder applied, and in a few hours good labour set in, expelling the vaginal and uterine contents. The placenta proved on inspection to have been detached by blood clot over an area as large as the palm of the hand. The child was alive.

TABLE No. VI.—*Placenta Prævia.*

Name	Date	Age and Para	Variety	Presentation	Period	Child	Remarks
1. A. S.	Dec. 1	40, ix.	Lateral	Hand and cord	Full time	A.	Combined versio
2. M. R.	Mar. 27	27, ii.	Marginal	Transverse	,,	D.	Version. Placent adherent
3. M.E.R.	May 19	20, iii.	,,	Breech	8 months	D.	Foot brought dow Fœtus mace rated
4. M.A.G.	Jun. 21	24, iii.	,,	Twins	7½ ,,	A.A.	See notes "Pr lapse of Funis
5. S. G.	,, 22	29, xi.	Lateral	—	5 ,,	—	
6. A. B.	Aug. 14	32, xii.	,,	Vertex	Full time	A.	Pains good, 2n stage
7. R. C.	,, 21	38, iii.	Marginal	,,	,,	D.	Death. Admitte septic. Versio
8. S. C.	Oct. 1	35, xii.	Lateral	,,	,,	A.	Hæmorrhage b fore admissio only
9. A. T.	,, 10	32, viii.	Central	,,	8 months	D.	Death. Admitte septic

PLACENTA PRÆVIA.

CASE I.—A. S. A month before her confinement this patient had a hæmorrhage. Subsequent to admission hæmorrhage recurred. The os was then nearly fully dilated and the membranes still unruptured; the edge of the placenta could be felt at the right side of the os. Combined version was performed and a foot brought down, delivery ensuing almost at once.

Case II.—M. R. Had hæmorrhage in January and repeated loss for a week before admission. A foot was very readily brought down, and delivery, which was left to nature, occurred three and a half hours later. The placenta was morbidly adherent to the lower uterine area to the margin of the os internum and was manually removed.

Case IV.—M. A. G. A twin pregnancy, with two separate placentæ, one of which overlapped the internal os.

Case VII.—R. C. This patient was driven nineteen miles from the country, and arrived in a collapsed condition, with pulse of 116. She had been attended by a midwife for severe hæmorrhage, and several vaginal examinations had been made during the 24 hours that the bleeding was going on. She gave a history of intermittent hæmorrhages for 2 months, and was about full time. The vagina was enormously distended with coagulated blood, and her clothing was saturated. After a large pewter dish full of clots was removed from the vagina, the cervix was found to admit three fingers, and the placenta could be felt overlapping half the orifice. External version was performed under chloroform, and a foot brought down, delivery following in an hour by natural efforts. The placenta was retained, and, as hæmorrhage continued, the hand was introduced, and the placenta removed. Twelve hours later the pulse was imperceptible, and temperature 103·4° F., while auscultation gave cardiac beat 160. Two pints of saline solution were transfused, but with little effect, the temperature being the same evening 104·2° F. A uterine douche was given, but the cavity was empty, and the walls smooth. Death occurred on the third night, the temperature having fallen and remained during the day at 101° F.

Case VIII.—S. C. Had only slight hæmorrhage. The patient was in good labour, and delivery was effected by natural efforts without trouble.

Case IX.—Was eight months pregnant. Within six weeks before admission she twice had somewhat severe hæmorrhage, and five days before admission had another very severe one. A " handy woman " was sent for, and she made several vaginal examinations. She then sent for a local practitioner, who also examined the patient, and ordered her to keep her bed. The hæmorrhage ceased for a time, but on the third day the patient had a prolonged and severe rigor

lasting ten minutes, and during which the bed was shaking. Two hours later another severe hæmorrhage came on, and the "handy woman" was again sent for, and a second practitioner, who ordered her at once into the hospital. The bleeding had been going on for six hours, and on her admission pulse was 140 and temperature 96° F.

On making a vaginal examination, the whole placenta was felt lying in the vagina, and the os fully dilated. She was put into the cross-bed position, and while being washed externally a pain expelled the placenta, the child following immediately.

Six hours later she had a temperature of 102° F., and pulse 144. The temperature continued to rise till it reached 105° next evening, and it remained at that elevation until the seventh evening, when it reached 106° F., and the patient died. The uterus was several times douched, and the Rheinstädter was used on one occasion, after which the cavity was plugged with iodoform gauze. She was given antistreptococcic serum on two occasions, at intervals of twelve hours, but as there was no reaction its use was discontinued. She was fed in the usual way with beef tea, chicken tea, and milk, with whisky ℥xvi. daily, and took the nourishment well. She was given on one occasion a wet pack, but this only brought on a hysterical attack almost resembling mania.

Though we have to record two deaths under this heading, we feel that we cannot be held responsible for the septic condition which produced the fatal termination, as in both cases frequent vaginal examination had been made by handy women for some days before admission. One patient had had a severe rigor the day before she entered the hospital, and both had lost a very considerable amount of blood, and one had a high temperature on admission; the other developed it within a few hours.

POST-PARTUM HÆMORRHAGE.

Of the 7 cases of severity 2 were due to adherent placenta and 1 to retained placenta with the cervix tightly contracted, so that the fingers had to be passed into the uterus for its removal. In 1 the anterior lip of the cervix was prolapsed, some portions of the membranes being retained *in utero.*

One occurred in a case of arrested breech, recorded under that heading; another in one of the cases (E. N.) recorded under "Accidental Hæmorrhage." The last had a placenta retained, which was expressed. In all these cases hot douche, massage, and ergot administered hypodermically proved sufficient, and the puerperium was uneventful.

There were 3 cases of secondary hæmorrhage. One occurred 26 hours after delivery, and another on the third day, and in both of these portions of the secundines were removed. The third was on the seventh day, and no cause could be found for its occurrence. None of them were dangerous.

HÆMATOMA.

Cases of this affection of the vulva or perineum were all mild and required no treatment. They were produced by wounds during delivery followed by subcutaneous extravasation, and became absorbed in a few days without treatment.

There was a case of hæmatoma of the cervix occurring in a 1-para, aged twenty-four, admitted in an alcoholic state, with pulse of 134 and temperature of 100°. Labour lasted ten hours, and after delivery the anterior lip of the cervix, greatly distended by an extravasation of blood in its tissue, protruded from the vulva. Corrosive pads were kept on the external genitals for some days, and the swelling gradually disappeared. We refer with great interest to this case, as only 3 others have been put on record, 2 of them in the annals of this hospital.

INVERSION OF THE UTERUS.

This was a partial inversion, and was produced in a 1-para, aged twenty-six. Forceps had been applied on account of a very prolonged labour (72 hours) following early rupture of the membranes with escape of the liquor amnii. The patient

was delivered as soon as she came into the second stage, as her pulse rose to 120, with fœtal heart 164. There was considerable post-partum hæmorrhage, and on introducing the hand into the vagina to remove clots a partial inversion was felt, the fundus being depressed as far as the os internum. On replacing this and giving a hot intra-uterine douche, hæmorrhage ceased. Puerperium was normal.

HYDRAMNIOS.

Six of these cases were slight; the fœtus in each case presented by the head, and the average weight was considerably over 8 lbs. None of them were in primiparæ.

Of the remaining seven, two occurred in twin pregnancies. In one there was hydramnios of the second sac only. There was also considerable œdema of the feet and legs. Both fœtuses presented by the breech. They weighed $7\frac{1}{4}$ and $8\frac{1}{2}$ lbs. respectively, and both were alive. In the second case both sacs presented the condition, and both children were born as vertex. Of the remainder, two were breech presentations—one with $1\frac{1}{2}$ gallons of liquor amnii and a dead fœtus, and in the other the child, which was also dead, had a spina bifida, and was otherwise deformed. Another case, from which a large amount of liquor amnii had already escaped, was found to have a bag of water before the head, and on puncturing this 3 pints of fluid escaped. After five grains of quin. sulph. had been given in this case good pains set in, and a living child was expelled. From another, on puncturing the membranes, 7 quarts of fluid escaped : and after the lapse of some hours and the administration of five grains of quin. sulph., a macerated anencephalic fœtus was expelled. In the last case $6\frac{1}{2}$ pints of fluid were removed, and a dead child was expelled. It had no orifice to the nostrils and no lobes to the ears, besides having unformed digits on the outer side of each hand.

HYPEREMESIS.

But two cases of this condition came under treatment during the year, and they were as follow :—

M. P., aged thirty-two, 6-para ; admitted on November 14th, 1898, from one of the general hospitals, to which she had been admitted as a case of intestinal obstruction on account of incessant vomiting for two days previously. She was in a very emaciated condition, with almost imperceptible pulse. The pregnancy dated five months. On examination the os proved to be the size of a five-shilling piece, membranes ruptured, breech presenting. There was some hæmorrhage, and labour pains were absent. The tongue was dry and brown, and the face had an anxious expression. Traction was made on the breech, and a macerated fœtus weighing 1 lb. delivered. The placenta came away in pieces, a large portion of it being removed with Rheinstädter's curette. The vomiting ceased after delivery, but on the third day the patient had a temperature of 103·4° F., and a uterine douche was given with good result. On the sixth day there was a rise to 101·4° F., and the Rheinstädter removed some fragments, after which the temperature remained normal, and the patient went out on the tenth day in fairly good health.

L. L., aged thirty-two, 6-para. Seven and a half months pregnant. Admitted December 30th, with history of persistent vomiting for six days, and even water given by the mouth was returned at once. She was vomiting clear fluid on admission ; had a dry, brown tongue, with enlarged papillæ ; pulse was 144 and aspect wretched ; face pale and pinched. The os was dilated sufficiently to admit the finger ; vertex presenting and membranes unruptured. No fœtal heart could be heard. She was fed by nutrient enemata every four hours ; the vomiting, which continued for some hours, gradually ceased after a quarter of a grain of morphia had been given hypodermically.

The urine was scanty and turbid, but contained no albumen. Pains were very feeble, and came on at long intervals. The cervix was plugged with iodoform gauze and the vagina with boiled wool the next day. These were removed 24 hours later, when, as the cervix admitted 3 fingers with ease, and the membranes were still unruptured, combined version was performed, delivery taking place 3 hours later. The child was macerated, and weighed $3\frac{1}{2}$ lbs. Convalescence was normal; pulse gradually fell, and patient left hospital on the 8th day.

MULTIPLE PREGNANCY—TWINS.

Twenty-eight cases of this variety of multiple pregnancy were treated in the hospital during the year, giving a percentage of 1·82. The following table shows the presentations:—

Both Vertex	7
Vertex and Breech	9
Breech and Vertex	5
Both Breech	4
Vertex and Transverse	1
Vertex and Face (Locked) ...	1
Born in Membranes ($5\frac{1}{2}$ months) ...	1
Total	28

Twenty-one of these patients were confined at or near full term, and all these children, with one exception, were born alive. In this case the woman, a 6-para, had never given birth to a living child, and both the fœtuses were macerated. She carried them just beyond the eighth month, and the case is also recorded under "Hydramnios."

In 17 of these the natural efforts expelled both children. Two of them, one a 12-para and one a 7-para, had previously borne twins.

The case in which vertex and transverse presentation occurred was amongst the 7 premature deliveries. In only 2 of these cases had the children reached a viable period, and they were born alive. Two at an early period of pregnancy were expelled in the membranes.

One of these patients was pregnant for the twentieth time. Her age was forty.

In none of these multiple pregnancies was there any post-partum hæmorrhage.

The case of triplets occurred at the 6½ month. The fœtuses, weighing one pound each, were born alive. They were all males, and had a common placenta. The first was a hand presentation, the second a footling, and the third was born in the membranes.

LOCKED TWINS.

R. D., aged twenty-six, 1-para, admitted August 16th in good labour. A bag of membranes was in the vagina, and contained some dark-coloured, foul-smelling fluid. When this had escaped a soft collapsed head was easily felt with the face of the second child fixed at the brim; its chin pressed into the chest of the first, the membranes being already ruptured. The fronto-mental diameter was in the transverse, with the frontal region lying to the right side. The pains were strong, and after rupture of the sac of the first child descent and forward rotation of the chin occurred, and a living child, weighing 5¼ lbs., escaped. The first child then came away, followed by the common placenta, one portion of which was healthy, but the part which supplied the first child was atrophied, thin, and dark in colour, containing fatty nodules. The cord of this child was shrunken, and the fœtus macerated. Puerperium was normal.

MYOMA UTERI.

There were 7 patients during the year with this complica-

tion present, but in none of them did it offer any considerable obstacle to confinement or trouble during convalescence, and in several cases a considerable diminution in the size of the tumour took place before their discharge from hospital.

One (E. E.) is recorded fully under "Induction of Labour," Case V. One (M. C.), aged twenty-nine, 2-para, who had previously aborted, was admitted with a history of 4 months' pregnancy. An ovum of about the size of 7 weeks was discharged some hours after admission, but though the sac was complete there was no trace of a fœtus in it. There was a very hard nodule, as large as a walnut, on the anterior wall of the uterus, which was lifted out of the pelvis by a hard tumour lying in Douglas' space, so that the Bozeman passed nearly to the umbilicus.

A. R., aged twenty-four, 1-para, delivered of a full-term child, had a freely movable myoma on the anterior fundal wall the size and shape of a full-time child's foot.

M. O'C., aged thirty-five, 1-para, with some contraction at the outlet in the transverse, who was delivered by forceps (occipito-posterior presentation), had a myoma as large as a fœtal head bulging into the uterine cavity and situated on the lower part of the lateral wall. After labour this almost completely filled the pelvis, and was easily explored with a Bozeman. There was some temperature during the puerperium, and the uterine cavity was found to be altogether to the right side of the tumour.

Two cases had multiple myomata. None of them had any post-partum hæmorrhage.

INDUCTION OF ABORTION.

The 5 cases under this heading were all treated on account of hæmorrhages continuing for many days (with in one case a foul discharge). The period of pregnancy varied from three to five months. In every case the cervix was dilated

by means of sea-tangle tents, and when sufficient dilatation had occurred the uterus was emptied. In 4 cases the fœtus was removed by means of ovum forceps and the placenta with the finger and Rheinstädter curette. In 2 of them the placenta lay over the os internum, and, as Winckel suggests, this condition probably was the cause of the abortion.

The last case is as follows:—

R. C., aged thirty-four, 13-para. History of four months' pregnancy, with hæmorrhage during the last four weeks, intermittent at first, but constant during the past ten days. The uterus extended as high as the umbilicus, the os externum patulous, but os internum closed. She was very anæmic, and the pulse somewhat feeble. Four seatangle tents were inserted, and the vagina plugged with iodoform gauze and boiled wool. Twenty-four hours later plugs and tents were removed, and the os admitted two fingers. The placenta was easily felt, and the membranes were unruptured, with the fœtal head over the os. Twelve hours later the os internum was tightly closed. A hot vaginal douche was given, and the vagina plugged. Fourteen hours later the os was still closed, and two tents were inserted with difficulty, and removed in 24 hours. As there was some tenderness in the vagina, the patient from this time was given only hot vaginal douches. She had occasional pains, which passed off, and it was not until five days after the last tents had been removed that she expelled the contents of the uterus—a five months living fœtus, and about three pints of thick blood which resembled treacle, and had evidently been extravasated for a long period. The placental tissue covered nearly the whole circumference of the ovum, and at the upper pole was detached from the uterus. The puerperium was uneventful.

The percentage application of forceps was 1·10 in extern and 4·15 in intern maternity. This discrepancy is accounted for, as on previous years, by the large number of primiparæ who come into hospital for confinement, as will be seen by glancing at Table No. IV.

Four of the cases had persistent occipito-posterior pre-

sentation, but were delivered with little difficulty. They
were primiparæ.

Three of the patients had marked œdema of lower limbs
and abdomen, with highly albuminous urine, which was
very scanty. After delivery the albumen and œdema
gradually disappeared.

In one case there was very considerable difficulty in
delivering the head, and the shoulders becoming impacted
gave further trouble. The child was born dead, and
weighed 9¼ lbs.

In three cases the child's head bore marks of consider-
able pressure from the pelvic bones. In one the delay
was caused by an exostosis behind the symphysis. The
marks of the promontory and symphysis in another persisted
on the cranial bones for some days after birth.

Nine of these 66 cases are recorded in the table of
morbidity; the remainder had normal puerperium.

TABLE No. VII.—*Application of Forceps.*

Indications		Dead Children	Remarks
Delay in 2nd stage, with danger to mother	40	5	1 in case of physometra, *q.v.*; 2 dead some days, knot on cord; 1 impacted shoulders after great difficulty in deli- very of head, traction one hour
Threatened death of fœtus	9	—	
Eclampsia	1	—	
Threatened rupture of uterus	2	—	
Threatened eclampsia	3	—	In each case there was marked œdema of the limbs, vulva, and lower abdomen, scanty and highly albuminous urine
Myoma and pelvic con- traction	5	2	1 of these occipito-posterior
Prolapse of cord	4	2	
Accidental hæmorrhage	2	1	Macerated fœtus, maternal death, *q.v.*
Total,	66	10	

Sub-table A.—*Showing Number of Pregnancy.*

I.-para.	-	52	VII.-para.	-	1
II.-para.	-	5	IX.-para.	-	1
III.-para.	-	3	X.-para.	-	1
IV.-para.	-	1	XIV.-para.	-	1
V.-para.	-	1			
			Total	-	66

Sub-table B.—*Showing Ages of Primiparæ.*

17–25	-	-	26
26–30	-	-	17
31–35	-	-	5
36–45	-	-	4

INDUCTION OF LABOUR.

The following are the five cases of this operation :—

CASE I.—K. M'E., aged thirty-eight, 5-para, December 24th, 1898. The pelvic measurements obtained by Skutsch's pelvimeter were at the brim, antero-posterior, 9·25 cm. ; transverse, 14 cm. Her children had all been dead born—the first and third being breech presentations, the second a face, and the last premature. From her menstrual history she was three weeks short of full time. The head was above the brim, the cervix soft, os admitting two fingers, and membranes presenting. The cervix was much torn from her previous labours. Two gum elastic bougies were passed into the uterus, and the vagina loosely packed with boiled wool, and a binder applied. Next day, the os being half dilated and the head engaging at the brim, the bougies were removed, but as pains were feeble four fresh bougies were introduced. The same evening a quantity of clear fluid escaped, and next day the os was nearly fully dilated and the brow presenting. This was easily rectified bimanually, the bougies removed, and the bag of waters, which was still intact, punctured, a tight binder being at the same time applied. Next day, pains having continued at long intervals, the os was fully dilated, and the head was not yet fixed. Patient was left some hours, and, as no advance took place, combined version was performed, and a living child weighing 8¾lbs. delivered. Puerperium was normal.

CASE II.—L. L., fully described under "Hyperemesis."

CASE III.—M. D., aged twenty-nine, 3-para, May 13th, 1899. Pelvic measurements—c.v. 9·75 cm. ; transverse 10·5 cm. at brim ; transverse at outlet 5·25 cm. The right pubic ramus ran nearly straight downwards, and three finger-points were passed with difficulty between the ischial tuberosities. On May 15th three bougies were passed and removed next day, the os being the size of a two-shilling piece ; the vagina was plugged with boiled wool. On the 17th some fluid escaped, but pains ceased, and on the 20th the vagina was again plugged. Next day, with os the size of a shilling and membranes unruptured, four bougies were passed, the vagina was plugged, and quin. sulph., gr. v., administered with good result. The bougies were removed on the 22nd, os half dilated, and at 4 a.m. the following day foetus 3¾lbs. born alive, as occipito-posterior.

CASE IV.—M. K., aged thirty-six, 14-para, June 2nd. Her first seven pregnancies were terminated by evisceration or instrumentally. She has now four living children, labour having been induced in the Rotunda five times, as follows :—1887, 1889 (child dead, she was informed that she was too long in coming from the country ; in 1891, she had an abortion at home), 1893, 1895, 1897.

Pelvic measurements—conj. vera 6·1 cm. ; transverse 12 cm. Last menstruation, October 1st, 1898. Head was above the brim, cervix widely lacerated, os admits two fingers, and membranes intact. On June 4th two bougies were introduced, and next day, after a hot vaginal douche, three more were passed in close to the two already *in utero*, and the vagina was plugged. On June 6th, os nearly dilated, membranes unruptured and head engaging ; bougies were removed and two more introduced. Quin. sulph., gr. v., were given twice, at intervals of two hours, with good result. At 4 a.m. the following day the pains were good, the membranes were ruptured artificially and the bougies removed, the head being fixed at the brim. There was some œdema of the vulva. This increased gradually, and at 10 a.m. the patient, though her pulse was 84, and foetal heart 130, was slightly incoherent. Forceps were applied with the head at the brim. On making traction the head came slowly down, and suddenly slipped over the very prominent promontory, the rest of delivery being easy, and rotation occurring as the descent took place. The child weighed 6lbs. Puerperium was normal.

CASE V.—E. E., aged thirty-five, 8-para. Her seven previous labours had been terminated by embryulcia or craniotomy. Pelvic measurement gave conj. vera, 6·4 cm. ; transverse 10·5 cm. She, as the last patient, came from Co. Kerry, and was $7\frac{1}{2}$ months pregnant. The cervix was lacerated in all directions, and the os internum admitted the finger-tip. On October 9th two bougies were introduced, and the vagina plugged with boiled wool. Twenty-four hours later, on removing the plugs, the cervix was soft, and admitted three fingers, and there was considerable softening of the vagina. The bougies were left in, and three more were inserted, with some more plugs. The following afternoon the patient was having pains, and, as the os was more than half dilated, and there was some moulding of the head, with membranes still unruptured, the bougies were removed. After this the pains continued strong and fairly frequent, and the fœtus, weighing $3\frac{1}{4}$ lbs., was expelled suddenly alive. There was a fibroid tumour as large as a pigeon's egg on the fundus. She made an excellent recovery.

MANUAL REMOVAL OF PLACENTA.

Morbid adhesion of the placenta was recorded on twenty occasions. In two of these there was a morbidity temperature, one being due to puerperal ulcer. Nine were in primiparæ.

PORRO'S OPERATION.

CASE IV.—This patient was sent in from the Extern Maternity. She had been in labour from the preceding evening, and, though a primipara, the head was above the brim of the pelvis. Her pulse was 128 and temperature 97·8° F. In making a vaginal examination it was found impossible to pass two fingers between the ischial tuberosities. The symphysis was markedly rostrate. The antero-posterior diameter was 9 cm., the membranes unruptured, and the os the size of a five-shilling piece. The measurement between the anterior superior spines of the ilium gave 25·5 cm., and the iliac crests 26·5 cm. She was otherwise deformed, was of small stature, had irregular features, and had a cleft palate. The apex of the right lung had cavities in it, and coarse crepitations were easily detected over the same side. As the pains were feeble, and as it was late at night, she was given half a grain of morphia hypodermically, and the operating theatre prepared. She slept during the rest of the night, and at 7 30 a.m., after some pains, the membranes ruptured, allowing some liquor amnii to escape. At 9 a.m. the

abdomen was opened and Porro's operation performed, and a living child, weighing $7\frac{1}{2}$ lbs., extracted. The patient was doing well until the third day, when the pulse became gradually faster, rising to 148. She became maniacal, and then unconscious, with brown, dry tongue, and nystagmus, and died at 8 a.m. on the fourth day.

Post-mortem showed granular contracted kidneys, flabby heart, vomica in right lung the size of a walnut, and pleura everywhere adherent. The brain was healthy. Some fluid was found in the peritoneal cavity, but no macroscopic evidence of peritonitis, and the wound had united well. Cultures showed *Staphylococcus albus* to be present.

PHYSOMETRA AND EMBOLISM.

Patient was an exceedingly stout primipara of forty-three, and came in from the country, where she had been in labour for a fortnight, attended by a " nurse." She looked extremely ill—pallor of face and lividity of lips ; the pulse was 140 and scarcely perceptible. Her body and limbs were indescribably dirty. The abdomen was enormously distended, and the fœtus could not be palpated. There was a history of amenorrhœa for three years. On separating the labia the fœtal head was seen pulpy and greenish in colour, and the cranial bones soft and overlapping. Pains were absent. Greenish, fœtid fluid and gas escaped from the vagina with a considerable noise, and again when the forceps were applied. The child, weighing $10\frac{1}{4}$ lbs., was delivered with difficulty. As it escaped a large quantity of gas passed from the uterus, and some very foul, green fluid. The placenta required manual removal, and the uterus was found distended to the lower surface of the liver, but contracted fairly under a hot douche and massage. The patient became more cyanosed, with difficulty and pain on respiration ; complained of a weight on the chest. Ether, digitalis and strychnin were given hypodermically, and the foot of the bed raised. She improved for a time, but a second attack came on in two hours, and she died in it.

Post-mortem examination showed the uterus to be flabby, and the interior of the uterine wall, except over the placental area, covered with a greenish, soft and excessively fœtid coating. The lungs were œdematous, the heart flabby, and the right auricle contained an *ante-mortem* clot the size of a small oyster; a pale clot about $2\frac{1}{2}$ inches long lay just inside the pulmonary valve, and extended along the artery, giving a cast of the valves, and a similar condition existed in the aorta, arising just within the left ventricle. The left heart was empty.

CASE II.—Admitted at 5 a.m. in good health, with fair labour pains, which remained so until 8 20 a.m., when she had a mug of milk and eat some bread and butter. She had then good pains, and there was some pressure on the perineum. She suddenly became cyanosed and lost consciousness, and the breathing became stertorous. The pulse was imperceptible at the wrist, and an absence of apex beat. Pupils widely dilated and insensible to light. The hand and head of the fœtus were presenting, and as the head receded version was at once performed, but the child could not be resuscitated. When the hand was introduced some blood escaped from the uterus, pointing to partial detachment of the placenta. *Post-mortem* examination showed the subdural space to contain some blood. Right heart dilated, and four fingers could be passed through the auriculo-ventricular valve; left heart hypertrophied; other organs somewhat congested but otherwise normal. Uterus firmly contracted and its walls thick.

VERSION.

As will be seen, there were 14 cases in which version was performed. Three of these were for placenta prævia, *q.v.* Two were done in cases of pelvic contraction, and one in hyperemesis after labour had been induced. Two in face and brow presentations respectively, four in transverse or shoulder presentations; one in a case of death from embolism was done without avail to save the child, and in the last there was prolapse of the cord in a case of some pelvic contraction. All these will be found recorded under their separate headings.

BREECH PRESENTATION.

Of the 78 children presenting by the breech 36 were born at full term, and of these 31 were delivered alive. Of this number 19 were delivered by natural efforts entirely, or assisted simply by pressure on the fundus. The remainder required assistance. One was a case of impacted breech, which will be dealt with elsewhere. One of these children, which required to be Schultzed, died on the second day, after vomiting blood. Amongst the 5 dead children 1 was macerated, 2 were deformed, 1 being hydrocephalic, and with the fifth there was hydramnios, one and a half gallons of liquor amnii escaping when the membranes were artificially ruptured. In another case, the breech failing to engage, a foot was brought down, and delivery left to nature. There was slight transverse narrowing at the brim. In all these, except the macerated fœtus, the arms and head were extended.

Twenty children were prematurely born, and of these 15 (all under $7\frac{1}{2}$ months) were stillborn, 2 being macerated. The remaining 5 (all above $7\frac{1}{2}$ months) were born alive, 2 of them requiring active interference.

Twenty-two occurred in 17 twin pregnancies. Thirteen were at or near full term, all of which were alive, and in only 2 of them was active interference required. The remainder (6) in 4 cases were between $6\frac{1}{2}$ and 8 months' pregnancies, and all but one (which was macerated) were born alive.

FACE PRESENTATION.

The face presented in five cases coming under treatment in the Intern Maternity, and three of these occurred in primiparæ. Of the remainder one was a 2-para. Two of these terminated by natural effort; two on account of prolonged delay, associated with great rapidity of the fœtal heart and respiratory movements on the part of the child, were delivered by forceps. In one of these the

lower maxilla was at an early stage caught at the pelvic brim. The mouth could be felt widely open, and the anterior fontanelle was easily felt. Traction made during a pain on the superior maxilla with some pressure forward caused extension of the head and forward rotation of the chin. Two and a half hours later it was necessary to deliver for the reasons given. In the other case, that of the 2-para, the perineum had on the first confinement been lacerated into the rectum, but united on being stitched. The same amount of injury was caused on this occasion, and the result after suturing proved remarkably good. The fifth case was that of a 5-para who had had difficult labours each time previously. She had been in labour for thirty-six hours when admitted, and the presenting part was not fixed and the membranes unruptured. Version was performed, and a living child delivered soon after. None of these cases showed morbidity.

IMPACTED BREECH.

This occurred in a primipara, aged twenty-six. The breech came almost to the perineum, and was there arrested, notwithstanding strong pains for two hours. Delivery was impossible by traction with the finger, and only after very prolonged traction with a fillet of gauze. A deep wound remained in the child's groin for 10 days after its birth.

BROW PRESENTATION.

C. H., aged forty, 6-para. The condition was diagnosticated when the os was half dilated and—as it was impossible to convert it into a vertex—internal version was performed. The child was born dead owing to complete separation of the placenta.

K. M'E., aged thirty-eight, 5-para. Fully described under "Induction of Labour."

The third was in the case of a premature delivery.

PERSISTENT OCCIPITO-POSTERIOR.

We only put on record twenty-four cases—a percentage of 1·5. Of these four only, all occurring in primiparæ, were delivered with forceps on account of prolonged second stage, with signs of distress on the part of the mother. One is further recorded under "Myomata and Contracted Pelvis."

Of the remainder, two were primiparæ—one of whom had a premature child, and the second, twenty-nine hours in labour, delivered herself of a fœtus of 7½ lbs. Amongst multiparæ one had a premature child weighing 4½ lbs. The children of the rest averaged 7½ lbs., the largest being 9½ lbs., and in none was labour very prolonged. Only two children were stillborn, one being a seven and a half months' fœtus.

TABLE No. VIII.— *Prolapse of Funis.*

Name	Age	Date	Para	Period of Pregnancy	Presentation	Child	Remarks
1. M. A.	29	Nov. 16	VII.	6 months	Transverse	A.	Podalic version
2. A. M.	27	,,　1	III.	Full term	Footling	A.	Second of twin
3. A. S.	40	Dec. 1	IX.	,,	Hand and cord	A.	Placenta prævia, *q.v.* Version
4. M. M.	26	Jan. 29	V.	,,	Vertex	A.	Replaced; 2½ hours later version
5. M. K.	23	Feb. 9	I.	,,	Footling	A.	Cord ceased pulsating during examination; rapid extraction
6. S. F.	24	June 16	II.	7½ months	,,	A.	Rapid delivery
7. M. G.	30	Mar. 2	I.	Full term	Vertex	D.	
8. K. M.	21	May 26	I.	,,	,,	D.	Forceps
9. A.M'D.	25	,,　31	I.	,,	,,	D.	Forceps
10. F. F.	35	,,　10	III.	,,	Footling	A.	
11. M. S.	35	July 11	II.	,,	Vertex	D.	Child expressed
12. J. H.	31	Sep. 3	IV.	,,	Transverse	A.	Version, *vide* "Transverse Presentations."

PROLAPSE OF FUNIS.

Many of these cases are referred to elsewhere, as we state in the Table. Those which we note here are as follow:—

CASE IV.—First child delivered by forceps dead, and next three transverse presentation, delivered by version, and all still-born. She was admitted not in labour as a paying patient. When in good labour some days later the os was found to be nearly fully dilated and cord presenting, the head being above the brim. In endeavouring to replace the cord the membranes were ruptured, and the funis was then pushed up beyond the head. Labour continued strong for three hours, and the head failing to advance, internal version was performed, and a living child delivered.

CASE V.—M. K. The interest of the case lies in the fact that, with both feet in the vagina, the cord ceased pulsating, while the vaginal examination was being made, and the child began to make movements. It was, therefore, de-livered as quickly as possible. The child, which was born in asphyxia, recovered in Schultzing.

CASE VII.—M. G. A case of early rupture of the membranes, the os being only the size of a crown. The cord ceased pulsating during attempts at reposition. On account of the total escape of the liquor amnii, with only slight dilatation of the os, version was considered impracticable, and the delivery was left to nature. Some hours later it was deemed advisable to facilitate delivery by perforation, and shortly afterwards the fœtus was readily expressed. Satisfactory convalescence ensued.

CASE IX.—Forceps were in this case applied for delay in the second stage, with irregularity in the fœtal heart, and it was only on very careful examination before application of the blades that the cord was felt beside the fœtal face. The child was unfortunately dead on delivery.

CASE X.—The left foot presented at the vulva with the cord twisted twice round it. There was additional interest in this case from the fact that the epidermis was peeling off both feet to a considerable extent, large flakes being separated from the left one.

CASE XI.—Had a battledore placenta.

TRANSVERSE PRESENTATION.

Seven cases. In one, prolapse of feet, hands, and cord; in another, hand and cord in vagina; a third was A. S., recorded under "Placenta Prævia." In these podalic version was performed. In one case (E. B., 4-para) external cephalic version was done, and delivery left to nature. Two cases had macerated fœtuses delivered by spontaneous expulsion. In one, both arms appeared, then thorax, then head and feet came together. This was a six months' fœtus. The second, seven months pregnant, both feet and a hand of the fœtus were in the vagina on admission.

SHOULDER PRESENTATION.

The hand protruded from the vagina soon after admission. Internal version was at once performed, and a living child delivered.

RUPTURE OF THE UTERUS.

L. B., aged thirty-four, a primipara, married eight years. Passed through an apparently normal labour, lasting eleven hours, at the end of which she delivered herself of a child weighing 7½ lbs., the third stage lasting twenty minutes. Just before the birth of the child there were some severe pains, but she did not appear to be in any undue distress, and there was very little loss of blood, the uterus contracting well. Some hours afterwards the abdomen began to distend, but there was no marked tenderness, except at a spot low down on the left side of the uterus. In the evening the abdomen looked like that of an undelivered woman, but there was a normal pulse and temperature, and merely the normal amount of lochia. She had some vomiting, but as this symptom had been marked for some months before confinement, stress could not be placed upon it. Next morning, as the distension continued, an examination was carefully made for lacerations of the parturient tract. As the cervix would not admit two fingers, the cavity was explored with a Bozeman catheter without detecting any lesion in the uterine wall, though the escape of a small quantity of bloodstained fluid suggested the existence of it, and with this belief a fillet of iodoform gauze was passed into the uterine cavity. The vagina was uninjured. Hot foments,

sodii bicarb. and salicylat., failed to relieve the vomiting. The patient was fed entirely by enemata. On the second evening the pulse ran up from 98 to 134, the temperature then being 99·8° F. The pulse continued up next day, with temperature 99·8° F., but at midnight it suddenly ran up to 105° F., and pulse 160, when she died, being unconscious.

Post-mortem revealed a rent in the uterine wall allowing a finger to pass into the peritoneal cavity. It was longitudinal, and began just within the os internum on the lateral wall. The uterus was well contracted. There were three pints of blood-stained fluid in the peritoneal cavity, and some lymphy deposit on the distended intestines. The stomach was chronically distended, filling nearly half of the abdominal cavity, and containing one and a half pints of green fluid.

CASE II.—M. P., aged thirty-two, 9-para. September 28th. This patient gave a history of cessation of menstruation at the end of December, 1898. Fœtal movements were felt until June 15th, when she had a great fright. There were at the time severe abdominal pain and violent fœtal movements. Since that date she had felt no movements, and had been under observation at the Hospital Dispensary, and there had been no increase in the uterine tumour, which remained the size of a six months' pregnancy. About 5 p.m. on the day of admission, after taking castor-oil, she had very severe abdominal pains, which had ceased on admission. Some hours later severe pains were again felt, the cervix being fully dilated and the membranes punctured; the pulse and aspect good. She was given tinct. of opium, ℳ. xxx., and slept for some hours. On waking she complained of severe pain at the left side of the uterus, which was observed to be considerably smaller when it was palpated. On making a vaginal examination, the body of a macerated fœtus was found lying transversely in the vagina, and was delivered by gentle traction. The placenta soon followed, but after it came a considerable hæmorrhage, and on passing the Bozeman catheter through the cervix it passed into the abdominal cavity. With the finger a rent was felt in the left lateral uterine wall, through which appendices epiploicæ, passed into the vagina, could be easily felt. The uterus was lying to the right side, and was well contracted. Iodoform gauze strips were passed through the rent into the abdominal cavity after the return of the appendices, and the patient put to bed. That night the temperature was 102·5° F. Next

afternoon a vaginal douche of sterilised water was given, and a portion of the gauze removed. There was a rapid fall of temperature. The gauze was completely removed on the third day, and a steady convalescence followed. She has since been seen twice, and is in excellent health.

During the year a patient was confined normally of a 7 lb. child, who was treated in a similar manner, 18 months before, for a pretty extensive transverse laceration of the fundus, through which a coil of intestine was protruding into the vagina. She was on that occasion sent in from the Extern Maternity.

TABLE No. IX.—*Morbidity.*

Temperature	Nov.	Dec.	Jan	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
100·8° to 101·2° F.	2	4	9	–	7	4	1	–	1	5	2	1	36
101·2° to 102·2° F.	1	6	3	5	6	3	3	6	2	4	4	2	45
102·2° to 104° F.	3	4	6	4	5	4	4	3	3	4	3	1	44
104° F. and over	–	1	1	1	–	–	3	–	–	1	–	–	7
Total monthly -	6	15	19	10	18	11	11	9	6	14	9	4	132
Percentage -	5·6	11·2	14·7	9·4	14·2	7·8	7·2	6·9	4·5	8·9	6·1	2·9	8·29

SPECIFIC CAUSE OF MORBIDITY OTHER THAN SEPSIS.

Copræmia - - -	- 5
Bronchitis - - -	- 7
Abscess of hand on admission	- 1
Goître - - -	- 2
Hyperemesis - - -	- 1
Influenza - - -	- 4
Mastitis - - -	- 7
Phlebitis - - -	- 2
Phthisis - - -	- 2
Suppuration of hip-joint -	- 1
Syphilitic ulceration - -	- 1
Total - -	- 33

From the foregoing table it will be seen that the months of lowest morbidity are October and November, and the highest from December to March. The total number is considerably smaller than last year, though there is an increase of 78 in the number of patients. The same procedure is followed as in previous years as regards sterilisation of the patients' genitals, and as in the two preceding years every patient who is admitted, and who is still in the first stage, is given a hot bath, in which soap is plentifully used, and the head is thoroughly washed also ; a very large number of the patients are not subjected to vaginal examination.

As will be seen by Sub-Table A, we have put down 33 of these temperatures as being due to some specific cause. In these a cause sufficient to produce a rise of temperature was manifest; no local treatment was adopted as far as the pelvic organs were concerned, and the convalescence proceeded satisfactorily. We have, however, counted these in estimating the percentage morbidity. Although the greater number of cases show the temperature on the third or fourth day of the puerperium, we find that no day is free from danger, and in one case which we record the chart shows a normal range until the twelfth day, after which the patient had a temperature running up to 104·4° F., and remaining high for three days. The uterus contained some *débris* which was removed with the curette.

Of the 36 cases in which a temperature below 101·2° F. was observed, 13 had some pieces of membrane in the uterus or protruding from the cervix, and had an elevation on only one occasion, occurring on the second, third, or fourth day. In 18 cases no apparent cause was found, and they were given either a vaginal or uterine douche, as a precaution, or received no local treatment. The rise here also occurred on one occasion only. One was admitted with pyrexia, and the temperature became normal on the third morning.

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Four cases with a rise during the puerperium also on one occasion are classed under the sub-table, and in one case occurring on the seventh evening no cause could be assigned.

Of the 45 cases with temperature rising on one or more occasions above 101·2° F., but below 102·2° F., 13 belong to the sub-table. The majority of these had some lung condition complicating pregnancy. Several suffered from influenza, and four had slight inflammation of the breasts, which yielded to treatment. One, a 6-para, had a shivering fit on the seventh evening after a normal puerperium, and the thermometer registered 102·2° F. a short time later. She stated that the same condition had existed in each of her previous confinements. In 32 cases the removal of portions of secundines, or a vaginal douche given for fœtid lochia, proved sufficient, and in one of these there was a puerperal ulcer. Two cases in which the patient had goître developed temperatures late in the puerperium; they received no local treatment, and made good recoveries. In several cases the uterus was found in a state of acute anteflexion, with retention of lochia. It was difficult to introduce the Bozeman catheter in one of these on account of the flexion. One patient, who had a temperature only on the sixth evening, had, after discharge, aphasia and loss of power in the right arm; she suffered from aphasia while in hospital during the previous puerperium. In several cases nothing came away with the douche. In one, at the fifth day, a mass, consisting of membranous fragments and blood clot, as large as a hen's egg, was removed from the fundus.

Among the 44 cases with temperature below 104° but above 102·2° F., 20 are placed in the sub-table. Two of these had the rise after a period of great mental excitement, in one case verging on mania. This patient had also cracked nipples, and the temperature remained up for two days. One was admitted with a sinus leading into the hip-joint,

from which pus was discharging, and this leg was six inches shorter than the other. Seven had slight breast trouble; six were found to have small patches of pneumonia, and a few influenza. In the remaining case the patient was suffering from advanced phthisis.

Of the remainder, one case had extreme interest, and is as follows :—

D. M'C., aged twenty-five, 4·para, April 18th, gave a history of great pain in the left side for the past two months. She limped into hospital, holding her hand to her side. The labour was normal, and she made good progress until the third evening, when she had a rigor, and next morning temperature was 103° F. The uterus was explored. Its cavity was empty, but there was a swelling at the left cornu, which was very tender. On the fifth day there was purulent discharge from the uterus. The pus continued to flow from the Fallopian tube for ten days, gradually diminishing with a falling temperature, which on the twelfth day became normal. Some induration still existed on discharge ; but patient has been seen several times since, and is in good health.

One was sent in from a general hospital in a very emaciated condition. She had been under treatment for persistent vomiting. The membranes had ruptured, and the fœtus was macerated and decomposing. Her temperature remained normal after the sixth day. Four of these cases gave birth to macerated fœtuses. In the majority of the cases under this heading the conditions were similar to those enumerated before, and in only three did the temperature continue high for more than one or two days.

Under the last heading—viz., above 104° F.—we have 7 cases. One of these was the patient in the private ward, who was normal till the twelfth day. She was subject to fits of *petit mal.* One came in with a temperature of 103° F. from phthisis. One (E. L.) is recorded under " Eclampsia," *q. v.* One case of contracted pelvis, c. v., 9. cm., admitted

some time in labour, but who delivered herself, developed a temperature reaching 106° F. on the ninth day. She was douched twice daily, and plugged with iodoform gauze, and went out well. One of the three remaining cases, which reached 105° F., had a rise only on the seventh evening, and nothing was found on exploring the uterus, nor was any cause found on douching the other two, but they fell to normal after the douche.

TABLE No. X.—*Mortality.*

Name	Age	Para	Admitted		Delivered		Died		Cause of Death
L. R.	28	V.	Dec.	16	Dec.	16	Dec.	16	Pulmonary embolism
M. O'C.	29	II.	Feb.	17	Feb.	17	March	8	Sepsis
E. G.	42	X.	March	9	March	9	,,	9	Accidental hæmorrhage
M. C.	22	I.	April	20	April	21	April	24	Porro's operation
M. R.	30	I.	,,	22	Undelivered		,,	22	Eclampsia
L. B.	34	I.	Aug.	15	Aug.	15	Aug.	18	Rupture of uterus; sepsis
R. C.	34	IV.	,,	20	,,	20	,,	23	Sepsis; placenta prævia; admitted septic
A. T.	32	VII.	Oct.	10	Oct.	10	Oct.	17	Sepsis; placenta prævia; admitted septic
L. M.	43	I.	,,	12	,,	12	,,	12	Pulmonary embolism; physometra

CASE II.—M. O'C. admitted to private ward, in labour. There was no vaginal examination made, and the labour was easy, placenta coming away in ten minutes without any hæmorrhage and apparently entire. On the fourth morning she had a temperature of 102·8° F., pulse 112. The lochia were excessive but inodorous. A uterine douche was given, and a polypoid excrescence was felt on the lateral uterine wall, about one and a half inches long and very firm in consistence, and which proved on microscopic examination to be placental tissue. The temperature and pulse continued high, at times above 104° F., for fifteen days, notwithstanding douching and plugging with iodoform gauze, after

a preliminary curetting, and she then died. The uterus continued to involute, and at time of death was just above the symphysis.

Post-mortem examination showed œdema of lungs and incompetent tricuspid valve, with vegetations. There was no sign of peritonitis.

PATHOLOGICAL CONDITIONS OF THE NEW-BORN—ICTERUS.

From careful observations taken during alternate months during the year this condition is not by any means rare. Our statistics show a percentage amongst the live-born children of 16·5, and during the months of June and August it rose as high as 23. It appears to be more common amongst the prematurely-born children, and it is interesting to note that on one occasion of two premature twin children only one was affected. In every case it was an evanescent condition, appearing usually on the third or fourth day, though several times as late as the seventh, and passing off in three or four days. A proportion show yellowing of the conjunctiva, but it must be admitted that it is exceedingly difficult to obtain a sight of that part of the eye in some. However in others there was no discoloration, and the only sign was a bronzing of the skin, often only of the face, and the napkins were unstained. As a rule the children are fed by the mother solely, but we have seen it also in bottle-fed infants. The children are, as a rule, put to the breast within eight hours of their birth, but it was seen in a child that refused the breast until the third day, and in this case continued somewhat longer than usual. All these children went out of the hospital well. It is our custom in these cases to administer a small dose of sod. phos. During one month the experiment of administering castor-oil on the second day to a considerable number of infants was tried. Of these a very small number showed signs of icterus. They show no sluggishness while it lasts, and take the breast as well as usual.

CEPHALHÆMATOMA.

This was seen in five infants, and varied somewhat in extent. In one case it was situated over both parietal bones, on one side covering almost the entire bone and on the other the posterior half of it, coming on both sides to the margin of articulation with the occipital bone, so that an apparently depressed triangle could be seen at the back of the child's head, with soft, fluctuating swellings on either side. In every case after a few days a very definite hard ridge was easily felt at the outer edge of the swelling, and a very gradual diminution of the fluctuating portion occurred. No treatment was adopted. In every case the child went out in good health, and while in hospital did not appear to suffer discomfort from the condition. Nothing was seen of any of these children after discharge.

OPHTHALMIA NEONATORUM.

Nine children showed this condition. It was in every case mild, lasting at the most four days, and appearing usually on the third day as a purulent conjunctivitis, and only on one occasion was it bilateral. One of these children was directly infected from the mother, who came into hospital with purulent conjunctivitis with in-growing lashes. After these were epilated she soon recovered. The prophylactic treatment of introducing ℳ. ii. of a 1 per cent. solution of argent. nit. into each eye of every infant immediately after its birth is still continued, and if any signs of puffiness of the lids occur afterwards, the eyes are thoroughly cleansed with boric lotion, repeated as often as any accumulation occurs, and, in addition, argent. nit. 2 per cent., is used twice daily if the condition is anything but the mildest.

IMPERFORATE ANUS.

This infant was otherwise deformed. There was a fluid

swelling the size of an orange over the buttocks; the right leg was shortened and atrophied, the femur being dislocated on to the iliac bone, the leg being completely everted. The child, which was premature and was born alive, died on the second day.

Dr. A. Smith criticised the absence of the date of entry into and departure from hospital of patients. He pointed out that a new expression (mixed hæmorrhage) had been introduced as a form of accidental hæmorrhage, and he considered the use of this term a mistake, as it was quite unnecessary. It was curious that several of these accidental hæmorrhages occurred rather early in pregnancy. He pointed out cases occurring in the 8th, 7th, and 6th months, and he thought it was not proved satisfactorily that these were really cases of accidental hæmorrhage. The statement as to the exact value of the plug and binder in cases of accidental hæmorrhage was too dogmatic. As to the time of application of the forceps, the former teaching of the Rotunda Hospital was, he thought, after four hours in the second stage. He considered it a great improvement that the time test had been left out in the present Report, the indications laid down being dangers on the part of the mother. There was a case of locking of twins recorded, but on reading the account he could not agree that they were locked at all in the ordinary sense. He congratulated Dr. Purefoy on the mortality, which was very low, and on the state into which he had brought the morbidity of the house. The hospital still maintained its high position among similar institutions.

Dr. W. J. Smyly pointed out a case of threatened eclampsia just commencing labour in which two bougies were passed into the uterus. They were taught hitherto that one of the fundamental points in the treatment of eclampsia was to avoid any source of reflex irritation, and he, therefore, considered it bad practice to try to induce labour by bougies in eclampsia. Whether it was *post hoc* or *propter hoc*, the patient whose case he was discussing had her first eclamptic seizure some hours after the introduction of the bougies. He agreed with Dr. Smith in deprecating the use of the expression mixed accidental hæmorhage, inasmuch as there was no form which was altogether external, and internal hæmorrhage was the only form which might not be mixed. Coming to the three cases of

inversion of the uterus, it was a curious fact that when any rare case occurred they got three of them. That was a well-known rule in hospitals. There were also three cases of embolism in this Report. The indications for the forceps should be danger to the mother or danger to the child. When he was Master of the Rotunda he determined to follow that rule, and the result was that he had only twenty forceps cases in the house. If this rule was still followed, he asked why there were forty forceps cases one year and only twenty another year? The forceps had been applied in six cases of pelvic deformity. The interesting point was to know whether they had been put on before the head had passed the brim or afterwards, but this was not stated. All through the Report he found little imperfections which seemed to show that it had been carelessly put together. At page 247, in the case of a woman who had died of convulsions, the left lobe of the liver was said to have shown microscopically the usual patches of hæmorrhage, having no connection with any vascular system. He had never heard of " hæmorrhage having no connection with any vascular system." There were five or six cases of deaths which were attributable to ignorant midwifery, and it was a terrible thing to think that, in the city of Dublin, with three large maternity hospitals, and Sir Patrick Dun's Extern Maternity, where nurses were properly trained, lives should be lost through the attendance of absolutely ignorant women.

Dr. KIDD said that they need not pay attention to the clerical errors appearing in the Report. Referring to the treatment of complete inversion of the uterus, he thought that the rule taught in Dublin and elsewhere was that they should replace, first, those parts which came down last, and not to press upon the centre of the fundus that had been prolapsed. It was stated in a case of rupture of the uterus that strips of iodoform gauze 10 yards long were passed through the rent in the uterus into the abdominal cavity. This seemed to him an extraordinary length, but, perhaps, it was a clerical error.

Dr. JELLETT, speaking of the treatment of abortions, remarked the number of cases in the house that were curetted was nearly 50 per cent. Though he could not say that the curetting had led to any bad results, he thought they would do harm if they sent out men with the idea that 50 per cent. of abortions required curetting. The same idea had occurred to him as to others regarding the term mixed hæmorrhage, but certain German writers divided accidental hæmorrhage into concealed, external, and mixed, the last meaning

cases in which there was sufficient of both concealed and of external hæmorrhage. In a case of funis presentation the child was perforated, because version could not be done owing to the indications of threatened rupture. After perforation the woman was allowed to lie for several hours to deliver herself, and he asked what was the reason for this new departure in Rotunda treatment.

DR. TWEEDY, referring to a case of hæmatoma on page 253, described as a very rare condition, said it appeared to him that hæmatoma of the cervix was a condition that occurred before the os was fully opened, and before the presenting part had passed through the cervix. Winckel mentioned it as one of the causes of decrease in size of the os. He did not think that this condition of large anterior lip of the cervix protruding through the vulva came under the head of hæmatoma, but if it did, he thought it the commonest of all accidents.

DR. MACAN said that, though the mortality and morbidity results were very good, he agreed that most of the cases had been reported in such a way as to leave the important points out. As far as the external department went, he joined in the chorus against sending men out believing that 47 per cent. or so of abortion cases required curetting. He did not know how an old cervical laceration, unless there was extensive erosion, could cause post-partum hæmorrhage. Speaking of the treatment of accidental hæmorrhage, he could not say that plugging the uterus or vagina was at all a good treatment, for if the membranes were ruptured, and they plugged, they only made an external hæmorrhage internal. He commended the term mixed hæmorrhage, because they might have not only an external and an internal hæmorrhage, but also a slight external hæmorrhage with marked symptoms of internal hæmorrhage, which might then be termed mixed. As regards the cases of pelvic deformity, there should have been more definite data given as to the nature of the deformity in each case.

DR. PUREFOY said : Professor Smith was not quite satisfied as to the omission of sundry dates. I think, in the important cases, where these particulars were of interest or importance, they were supplied. It is a little surprising to me that a teacher of Professor Smith's attainments should not be familiar with the term " mixed " applied to accidental hæmorrhage. The term has some advantages, but I am not prepared to defend it. Professor Smith suggested that some of the cases described as accidental hæmorrhage were more probably cases of low insertion of the placenta. I do not

know that there is any good ground for that. It is true that when dealing with hæmorrhage in the sixth month of pregnancy it may be quite impossible to determine whether the placenta is low down or not. We examined our cases as carefully as possible, and our diagnosis in each case was confirmed. With regard to the table dealing with cases of accidental hæmorrhage, Professor Smith referred to it as proving the thing we did not want to prove, but I think in coming to that conclusion he was a little hasty. Our observation in the hospital for some years past has furnished us each year with accumulating proof that the use of the vaginal tampon in severe accidental hæmorrhage is a wise and judicious proceeding. We do not teach that it is a treatment applicable to every case of accidental hæmorrhage, and I take care in speaking to the class to point out that many cases met with can still be treated by assisting the uterus to contract, and then rupturing the membranes. The table shows that in only five cases did we consider the use of the tampon necessary, and that shows that we are not so firmly wedded to any particular line of treatment as to apply it indiscriminately. Professor Smith thinks we have made a distinct advance in omitting all allusion to the duration of second stage where the forceps is applied. I still think that the question of the duration of the second stage should be taken into account. It may be open to abuse, but so is every other good practice. I adhere to the opinion that the position of the twins is correctly described, and that it is correctly stated as a case of locked twins, the nature of the complication being in no way altered from the fact that one head was collapsed. Dr. Smyly formulated the very serious charge against us of introducing a new and unwise treatment of puerperal eclampsia. I fail to see how he deduces from the narration of the case any grounds for suggesting that we have adopted a new mode of treatment. The case was briefly this :— The patient, a primipara, was admitted to hospital in a bad condition, with marked œdema and scanty, albuminous urine. She was far advanced in pregnancy. The treatment adopted had the effect of bettering the condition to a large extent, so that the albumen almost disappeared from the urine. This improvement lasted only 48 hours, and in spite of the treatment the urine again became scanty and albuminous, and the swelling returned, and her condition was such that it appeared to me very likely eclampsia would supervene if treatment were not adopted. I still think that the emptying of the uterus by the safest method was the proper

proceeding. It is true that eight hours afterwards an eclamptic fit occurred, which Dr. Smyly attributes to the operation, but I do not agree with him. The condition of the patient was such, with the distension of the labia, that the skin covering one gave way. It will not be hard to understand that under these circumstances continuance of pregnancy was the last thing to be desired. I share to the fullest extent Dr. Smyly's feelings as to the urgent need for obviating the grievous results to our patients in this country from the ignorance and stupidity of our midwives. I am not sure that the establishment of a new register will deal with the difficulty or lessen the risks in any appreciable degree. In some of the forceps cases the child's head had not passed the brim. Dr. Kidd referred to the treatment of inverted uterus. I think the method adopted in this case was the proper one, and it was attended with a satisfactory result. Dr. Jellett referred to the abuse of the curette. I think many cases of abortion can be treated with the finger. It is true that in the hospital the curette is used in a number of cases, but most of the cases coming in are cases of incomplete abortion, with a discharge for days before, and in that condition they are not beneficial occupants of a ward where there are other patients. Dr. Hastings Tweedy, referring to the case of hæmatoma, made a statement which surprised me. It was that, in both his own practice and when in the Rotunda, he found that cases were common in which a gaping rent and bleeding cervix protruded between the labia. So far as I know they are not common at present. I do not see any connection between a rent and a bleeding cervix and the condition which I have described in the Report. The case of hæmatoma of the cervix was one in which extravasation of blood had taken place into the tissue of the cervix. As to Dr. Macan's remarks *re* use of the curette in the treatment of abortions, I think that probably the emptying of the uterus with the finger, which is possible in most of these cases, requires more dexterity and is more difficult than treatment with the curette. I endeavour, in speaking to the class, to impress how much can be done with the fingers. As to plugging in cases of abortion, when in the Coombe for the first few months I did tampon in a good many cases, but subsequently found I could dispense with it. The number of cases calling for it is very few indeed. Dr. M'Clintock's paper on rupture of the vagina is one of the most interesting of the many he has written. It is to be found in the *Dublin Medical Journal.* The expression " hardness of the uterus "

on palpation in cases of internal accidental hæmorrhage does not commend itself to Dr. Macan. Perhaps " hardness " does not convey what we mean. The feeling is one of tension, the uterus becomes more resistant. Dr. Macan thought the forceps was used too frequently. I may refer him to the Report of the Hospital which he published in 1889, dealing with 1,000 cases. The percentage of forceps cases was five—distinctly above the percentage in our report. Regarding the occurrence of icterus, Dr. Macan thought the percentage in infants ought to be 80. Our Report gives it as between 15 and 20, and we will not concede that our returns are not as accurate as any similar ones. As to the use of the bag in placenta prævia, the results in the hospital are so good that I do not feel tempted to change our present mode of treatment for any other.

PORRO'S OPERATION (EXTRA-PERITONEAL)— A SUCCESSFUL CASE FOR RUPTURED UTERUS COMPLICATED BY A LARGE MYOMA AND FIVE AND A HALF MONTHS' PREGNANCY.

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CASE.—I first saw the patient, Mrs. L. G., by request of Dr. Verner Furlong at 2 p.m. on Sunday, 6th August, 1899, when I ascertained the following facts :—Patient was thirty-eight years old, and married just two years. She had an abortion in February, 1898, at about the third month. Her general health had always been good, and menstruation normal, though she has always suffered more or less from constipation. She was now pregnant (for the second time) from five and a half to six months.

On Wednesday, August 2nd, three days before I saw her, she had an attack of vomiting, and sent for Dr. Furlong. Was better next day, and went about her usual duties.

On Friday, 4th, took to her bed again with vomiting and "cramps" (?) in her stomach. This condition had persisted up to the time I saw her. Dr. Furlong had examined her per vaginam, and had sent for me because he could find no cervix uteri or external os.

On palpation I found labour pains existing, and the "fundus" (?) reaching nearly to the umbilicus. On making a vaginal examia nation I could at first feel no cervix or external os, but found the true pelvis tightly filled with a tense elastic tumour. After further and more careful examination I discovered the os (the posterior lip only of which I could reach with much difficulty) about two inches above the upper border of the symphysis pubis, and came to the conclusion that I had to deal with a case of retroverted and "incarcerated uterus" (posterior sacculation) with labour pains present. The patient's temperature and pulse were normal.

Manifestly something must be done, and at once, or sooner or later rupture of the uterus would ensue.

The patient was put under Chcl.₃ in the cross-bed position, and I attempted to replace the uterus; but with imperfect anæsthesia, a very low bed, and no assistance I found it impossible to do so, and recommended the patient to come into the Coombe Hospital. She did so at 6 45 p.m. the same evening.

Having been properly prepared, she was profoundly anæsthetised, and Drs. Winifred Dickson (now Mrs. Martin) and R. H. Fleming, who were present, and invited to examine the case, confirmed my diagnosis, the former remarking " How very distinct the head is."

I found later that, during Dr. Fleming's examination, the uterus, owing to some unintentional manipulations of his, had slipped up out of the pelvis into its normal position. When it had done so it felt extremely like a uterus bicornis, the right horn being some-what the larger and harder of the two.

The theory at the time adopted to account for this was that the sulcus between the apparent " cornua " was due to the pressure of the promontory of the sacrum upon the uterine wall during its incarceration in the pelvis. The os was patulous, and about the size of half a crown. The patient was put to bed and given tr. opii m. xx. No uterine contraction was going on. She slept well during the night.

Here I insert the daily notes on patient's bed card up to the day of operation :—

Aug. 7th.—This morning pulse and temperature were normal; patient had a little vomiting, and was given pulv. bismuthi c̄.; soda. Also had an enema, which acted well.

Aug. 8th, Tuesday.—Patient restless in early part of night, but after tr. opii. m. xx. slept some hours. Temperature, a.m., 99·6°; pulse 100. Complains of pain if she lies on left side.

Aug. 9th, Wednesday.—Slept badly; complains of pain and extreme tenderness of abdomen, especially over what I have called the right cornu. A pessary which I had inserted on 6th inst., when uterus was replaced, was removed, a hot creolin 1 per cent. vaginal douche given, and, the abdominal pain being very severe, a hot belladonna stupe was applied; and later morph. sulph. gr. ¼ (hypodermically) was given. Highest temperature, 8 p.m., 99·4°; pulse normal.

Aug. 10th, Thursday.—On this date I came to the conclusion that this so-called right " cornu " was a " myoma " which had got

damaged in the pelvis, and that the extreme tenderness was due to a local peritonitis. The patient winced if you looked at her abdomen. Dr. Smyly, who happened to be in the hospital, saw her and concurred in this opinion. The patient had a good night, and her morning temperature was only 99·2°, with a pulse of 89, but the local tenderness over the myoma much increased, and in the afternoon the temperature rose to 103·4°, and the pulse to 108. She was given phenacetin grs. v., and later morph. sulph. gr. ¼ hypodermically.

Aug. 11th, Friday.—The patient had a good night, but her a.m. temperature was 103·6,° and her pulse 104. She had some vomiting, and the tenderness over the tumour (myoma?) was exquisite. I believed the myoma to be sloughing, and suggested laparotomy. About mid-day Dr. Kidd made a vaginal examination, and there were then no signs of impending labour present. Dr. Kidd was of opinion that the patient's condition was entirely due to a localised peritonitis, brought about by the pressure of the promontory (as I have already suggested), or by the manipulations resorted to in lifting the uterus up out of the pelvis, or by both, and that laparotomy was not indicated. At 6 30 p.m. that same evening the patient was delivered of a male fœtus about five and a half months. The membranes were intact. A uterine douche (creolin 1 per cent.) was given. At 8 30 p.m. her pulse was 116, her temperature 103·2°. She was given brandy ℥ss., and phenacetin grs. v. At 11 30 p.m. temperature 104·4°, brandy ℥ss., phenacetin grs. x. Body sponged, and afterwards cold pack.

Aug. 12th, Saturday.—Brandy ℥ss. every hour till 3 a.m., when temperature had fallen to 99°, but at 5 30 a.m. had again risen to 100·6°. During the day her temperature varied at times between 104°, 103·8°, 103·4°, and 99°. Pulse varied between 113, 124, 130, and 134. The patient's body was sponged several times; she was given brandy ℥ss. every hour, and she got phenacetin grs. v. twice, and morphia grs. ¼ once. She slept a good deal, and took nourishment fairly during the day. She was given phenacetin grs. x. at midnight.

Aug. 13th, Sunday.—I saw the patient at 10 a.m. She had been rambling during the night, and had had three slight rigors. She looked as septic as she could be. Her temperature was, at 9 a.m., 100·8°, and her pulse 104. She was drowsy and dull, but when roused said " she felt splendid, and had no pain at all;" and there was scarcely any tenderness on palpating her abdomen.

I went at once to Dr. Kidd (Master of the Hospital) and told
him I believed the woman would die if not operated on at once.
Dr. Kidd came with me and saw her, and, when we had eliminated
any "puerperal" element that could cause her condition, agreed
with me. The lochia, I may mention, were perfectly healthy. At
4 p.m. her temperature was just 105°, her pulse practically count-
less, and she was more or less delirous—she was in fact moribund.

With Dr. Kidd's kind permission and assistance, at 4 30 p.m. I
performed an abdominal hysterectomy by Porro's extra-peritoneal
method. The operation lasted from an hour to an hour and a half,
but the patient's aspect when it was over was considerably better
than when she was put on the table. The appendages were removed
along with the uterus. At 8 p.m. the temperature had fallen to 97°
(nearly 8° in four hours), and the pulse to 90. The patient, except
for a severe attack of diarrhœa, made an uninterrupted recovery,
and was quite convalescent in twenty-six days.

I submit her temperature and pulse chart.

The sutures were removed on the ninth day, and the union was
good. The stump was removed on twelfth day.

The suture immediately above and below the stump were so
inserted as to "pick up" its peritoneal covering, and ensure its
union with the parietal peritoneum; and this union was so perfect
that, though both the above suture tracks and one other became
infected from the sloughing stump, there were no evil results
whatever.

Finally, the abdominal incision healed up perfectly, and the
union was so good that one could scarcely tell the stump had ever
been brought into the wound at all. I examined the abdominal
incision on 4th January last, and I could scarcely believe the
cicatrix could have become so insignificant as it then was. The
patient on this date, too, assured me she had never felt better in her
life, and was putting up flesh, about which there was no manner of
doubt. On resuming marital relations she at first felt considerable
pain, but it gradually disappeared, and is now practically nil.
She has no bladder trouble whatever, and, in fact, says she does
not need to pass her urine nearly as frequently as she did for some
months before the operation.

An examination of the tumour after removal revealed a
condition of things that certainly I, for one, had not suspected.

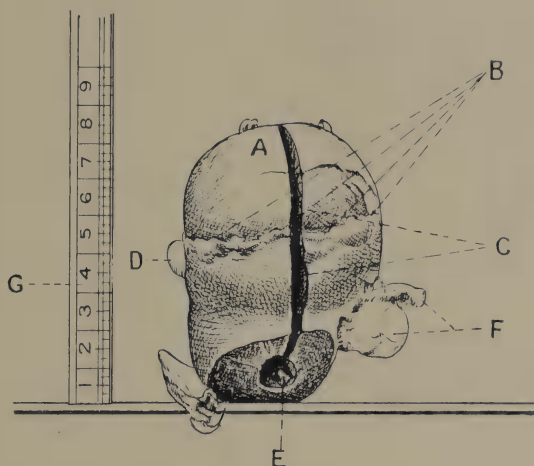The diagnosis of a myoma was correct, no doubt, but we
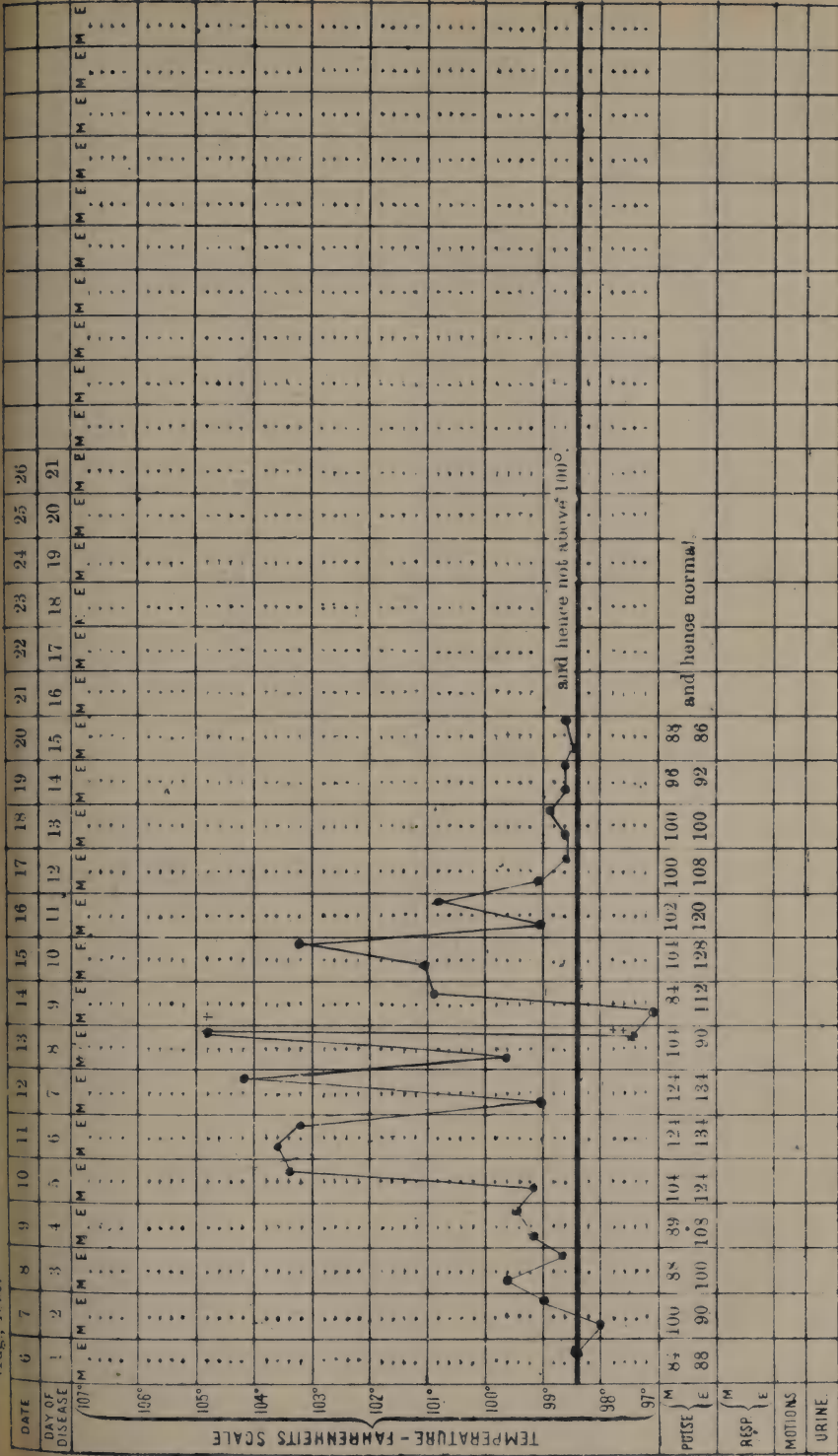
Temperature taken at 9 a.m. and 9 p.m.

† at 8 p.m.

† Temperature at 4 p.m.; pulse, 160–180; operation at 4·30 p.m. on the 13th.

(Posterior surface of uterus.)

A. Myoma.

B. Jagged edge of rupture in fundus uteri.

C. Vertical incision (after removal) through myoma and cavity.

D. Small subserous myoma on anterior uterine surface.

E. Orifice of cervical canal at line of amputation. Small piece of decidua
   p. protruding.

F. Right tube and ovary.

G. Centimetre rule.

found that this myoma (which was about the size of a foetal head at term) had caused a rupture of the uterus at the fundus between the two orifices of the Fallopian tubes, and that the tumour was sitting in the uterine wall much as an egg does in an egg-cup.

There had been no hæmorrhage whatever into the abdominal cavity, and all one noticed was some congestion of the blood vessels on the surface of the portion of the myoma that protruded through the rent in the uterus.

I have brought this case before the Obstetrical Section because it possesses, I think, certain points of interest for it; and I am anxious to have the opinion of the members on these points, which have most certainly been a puzzle to me. They are as follows:—(1) When did the uterus rupture? (2) Why did labour supervene so painlessly, rapidly, and so long (six days) after the replacement of the uterus? (3) What caused the sudden rise of temperature on the 10th August, and the still higher rises on the 12th and 13th? I ask these questions for the reason that I have already suggested—that I believed suppuration was going on in the myoma; but, on incising it, nothing of the kind was found, and I am at a loss to explain the facts of the case.

It has been objected that the operation I performed was not Porro's, on the grounds that the patient was not " gravid " at the time. However, it was performed by Porro's method, and the uterus was a puerperal one at any rate.

Again, I have been asked—why choose the extra-peritoneal method? I did not choose it. I adopted it as the most rapid method, for, in this case, time was everything; as when the patient was put upon the operation table I scarcely expected her to live to come off it.

It is early yet for me to express an opinion as to the merits of the various methods of performing partial or complete hysterectomy; nevertheless, where the vaginal and supra-

vaginal portions of the cervix are healthy, and there is no cause for extra haste (as there was in my case), it is my firm conviction that Porro's retro-peritoneal method is the ideal hysterectomy.

One word as to the operation I performed. The tendency is, I believe, to be too greedy—to drag the cervix up into the abdominal incision far more than is at all necessary, and thereby bring about that painful dragging pain that is so frequent after these operations, in addition to the bladder trouble (difficulty of retention) that so often arises.

As to the merits of Doyen's method of performing hysterectomy, I can only say that, as I have seen it performed, or even as it is described by the inventor in his own book, I do not think it can claim to be a strictly aseptic method. The very fact that it is necessary to perform the operation at all implies more or less that the mucous membrane of the uterine cavity and cervical canal is in all probability not healthy, and in the process of drawing up the vaginal portion through the incision in the floor of Douglas' pouch it is quite possible to infect the peritoneum.

The chief merit of Doyen's method seems to me to lie in the fact (mentioned before this Section of the Academy by Dr. W. J. Smyly, on 26th May, 1899, when he exhibited the first uterus removed by this method in this country) that no big vessels are encountered till the operation is practically over, when they are secured with very great ease and rapidity, and thus, as a rule, any excessive hæmorrhage is avoided.

In conclusion, I will merely state that the most recent statistics (those of Dr. Henry P. Ingram, Buffalo, U.S.A.) go to show that spontaneous rupture of the uterus is a rare (1 in 4,000 cases) occurrence, and when it does occur is usually due to fibroid (subserous) tumours, perhaps, as in my case, complicated by pregnancy and displacement.

Dr. Kidd said it was rather difficult to understand how it was that after a great many efforts had been made to relieve the uterus it went back almost by accidental manipulation. He could not account for the rise in temperature, especially as there was no evidence of suppuration. The patient was moribund on the table, and he had very little hope that she would make as good a recovery as she had made.

Dr. Smyly said he could not help thinking that the cause of the fever was in the tumour, because it disappeared immediately after the removal of the tumour. As to the reduction of the tumour, probably the greater portion of it had been pushed above the pubes by previous attempts, and it was only a coincidence that it went up during Dr. Fleming's manipulation.

Dr. Macan agreed that the tumour was the cause of the temperature. He did not think there could possibly be a question of rupture in the ordinary sense. If it had been ruptured where was the hæmorrhage? He thought labour itself might be sufficient to so separate the tumour from its surroundings as to cause it to become a dead body, which might become infected from the rectum.

Dr. Cole-Baker, in reply, said that from the ease with which the tumour was replaced, he did not think there could have been any adhesions. There was no trace of hæmorrhage into the abdominal cavity, or of broken-down adhesions in Douglas' pouch or to the intestines. As to infection from the rectum, the same suggestion was made at the Clinical Club, but it was pointed out that before the occurrence of infection there would have been some adhesion.

SHORT NOTES ON A CASE OF ROUND-CELLED SARCOMA OF BOTH OVARIES, WITH EXHIBIT, PHOTOGRAPHS, AND MICROSCOPIC PREPARATION.

By F. W. KIDD, M.D.;

Master, Coombe Hospital.

THE case which I have the honour of submitting to you is one of no little interest, in that such tumours are extremely rare. On looking over the "Transactions" of this Section of the Academy, the "Transactions" of the old Obstetrical Society, and the "Transactions" of the old Pathological Society, I cannot find a report of one similar case. It might be interesting to state here what some of the authorities state about sarcoma of the ovary. In the description of round-celled sarcoma in Green's "Morbid Anatomy" we find "They consist of round cells embedded in a scanty and usually soft homogeneous or finely granular intercellular substance; are exceedingly vascular; grow from the cutis-subcutaneous cellular tissue, periosteum, fasciæ, and the connective tissue of organs. They extend rapidly by peripheral growth, infiltrate the surrounding tissues, reproduce themselves in internal organs, and often involve the lymphatic glands. From their clinical and physical characters these tumours are very liable to be confounded with encephaloid cancer. They are distinguished by the absence of an alveolar stroma, and by the penetration of the intercellular substance between the individual cells." In the "American System of Gynæcology," we find under the heading of Sarcoma of the Ovary, "Though more

frequent in its occurrence than carcinoma, is still a comparatively rare tumour, Schroëder finding but 10 among 600 ovarian growths, while Olshausen reports that 12 out of 293 of his cases were of this nature. The spindle-celled variety is most common. The pure round-celled or medullary variety of sarcoma also attacks this gland, though very rarely. Such a condition, however, has been reported by Beigel and Albert; mixed-celled growths are found composed of both forms in varying proportions. These malignant ovarian growths are much more frequently bilateral than the proliferating cystomata, and when so they are generally of moderate size. In the majority of instances the solid tumours range from a child's fist to a man's head in bulk, though cysto-sarcomata may exceed in their dimensions even the uterus at term."

As regards the etiology of these tumours very little is known about them. They seem to prevail most extensively when the formative and functional activities of the gland are greatest. Even the newly born may have sarcomata of considerable size (Klebs), while a large majority of the tumours occur during childhood and the period of greatest sexual activity.

The gross appearance of ovarian sarcomata is not so irregular in outline as are the proliferating cystomata, being usually oval or roundish in contour. The surface is smooth as a rule, and of a whitish or whitish-pink colour; in consistence they are generally, though not always, quite firm, the round-celled variety being soft and brain-like. Among the secondary changes that take place in sarcomata the most important is fatty degeneration. The small size of the tumours and the early appearance of ascites account for the comparative rarity of adhesions. Barnes, in his "Diseases of Women," does not seem to recognise at all the condition of round-celled soft sarcoma of the ovary.

Bland Sutton, in his work on "Surgical Diseases of the Ovaries," states that the ovary is very prone to become the seat of sarcoma in early life. To this succeeds a period of comparative immunity, followed by a second period of renewed but diminished liability. Ovarian sarcomata of infancy, or oöphoromata, attack both ovaries in about half the cases, grow very rapidly, attain formidable proportions, and quickly destroy life. Their removal is attended with an excessively high rate of mortality, and in those recovering recurrence is the rule. It may attack the unborn child (*vide* case reported by Doran in "Transactions of Pathological Society," Vol. XL., p. 200; subject was fœtus born at 7th month). First period of excessive liability ends at puberty; they are rare between 16th and 25th years. From 25th to 45th years they occur occasionally, and are usually limited to one ovary. They grow quickly and destroy life rapidly. If successfully removed recurrence and death within the year is the rule. Sutton also says, " Sarcomata in adult women are more likely to be regarded as fibromyomata or fibromata than as oöphoromata, for they are of firmer texture, and present occasionally a whorled appearance. The distinction is further hampered by the fact that they mainly consist of spindle and fusiform cells. Pain and ascites are frequent concomitants of sarcomata occurring in adults." Again, " Many tumours of the ovary described as primary carcinomata prove on careful examination to be sarcomata. Much confusion has arisen from the fact that ovarian follicles entangled amidst sarcomatous tissue mimic the structural peculiarities of carcinoma. Nevertheless tumours of the ovary are occasionally encountered in which the chief changes are situated in the follicles. As the membrane granulosa is composed of epithelium tumours of this character come strictly under the definition of carcinoma; they grow rapidly, and infect the peritoneum;

when removed rapid recurrence and speedy death is the rule. In the majority of cases the peritoneum is infected before the patient comes under observation, hence operations are rarely undertaken. Primary cancer of the ovary requires careful observation with a full supply of material."

Pozzi says that Cohn estimates the frequency as about 1 per cent. in relation to cysts, basing the calculation on Schroëder's ovariotomies, usually bilateral, the spindle-celled or fibro-plastic being more frequent than the round-celled or embryo-plastic. Their surface is smooth, and the general form of the ovary is retained; the lesion is sometimes bilateral.

Weinlechner presented before the Obstetrical and Gynæcological Society of Vienna, March 26th, 1889, two ovaries of a young girl of twenty-one years which weighed 20 to 23 ounces, and were transformed into round-celled sarcoma. Ascites is always present, and cachexia rapidly appears. This rapid course clinically distinguishes between sarcoma and fibroma. C. Braun reports a well authenticated case of ovarian sarcoma in which a cure was maintained without relapse for eleven years.

Howard Kelly, in his recent work on Gynæcology, says that "Sarcomata are among the rarest of all the ovarian tumours. The diagnosis *sarcoma* is often made upon purely clinical basis, when a microscopic examination would show that a majority of these tumours were fibromata."

Bland Sutton collected 20 cases occurring in children 15 years of age and under.

Out of 100 ovarian tumours in women over 70 years of age there was one sarcoma.

Olshausen collected 37 cases, of which 5 were under 20, 9 between 20 and 30, 18 between 30 and 40, and 4 between 58 and 65. In the younger patients the round-celled form

predominates, while the spindle-celled becomes commoner with advancing age.

Chief characteristics are rapid growth and ascites. Metastases are distributed through the veins, and are found in the stomach peritoneum, pleura, intestine. The tumour spreads rapidly by continuity and contiguity until the broad ligaments, the uterus, and surrounding parts are infiltrated.

On May 23rd, 1890, Dr. Bagot, then Assistant-Physician at the Rotunda, brought forward a case of non-malignant solid fibro-myoma of the ovary about the size of a walnut.

On 20th December, 1895, Dr. Alfred Smith exhibited a solid ovarian tumour which had grown rapidly, patient stating that two months previous to operation increase of size was scarcely noticeable. In this abdominal palpation revealed a quantity of ascitic fluid, but no tumour could be made out. Dr. M'Hugh removed 14 pints of fluid by paracentesis, and then a tumour was distinctly palpable. The fluid was removed on the diagnosis being made of portal obstruction, but it returned very rapidly after the paracentesis. On account of the great supply of fluid the tumour could be easily balloted; 36 hours after the operation he had to re-open the abdomen for hæmorrhage, when he found that the blood was coming from an artery immediately below the suture. This was explained by suggesting that an artery was damaged in perforating the broad ligament to introduce the suture. Could it not be explained as follows—that the tissues must have been infiltrated, that the artery was injured by the ligature, and that the strain of vomiting caused it to break down completely. If Dr. Alfred Smith is here at present I would ask him if he has any knowledge of the duration of the patient's life after the operation.

Smith quotes Thornton's 10 cases, of which 3 died from
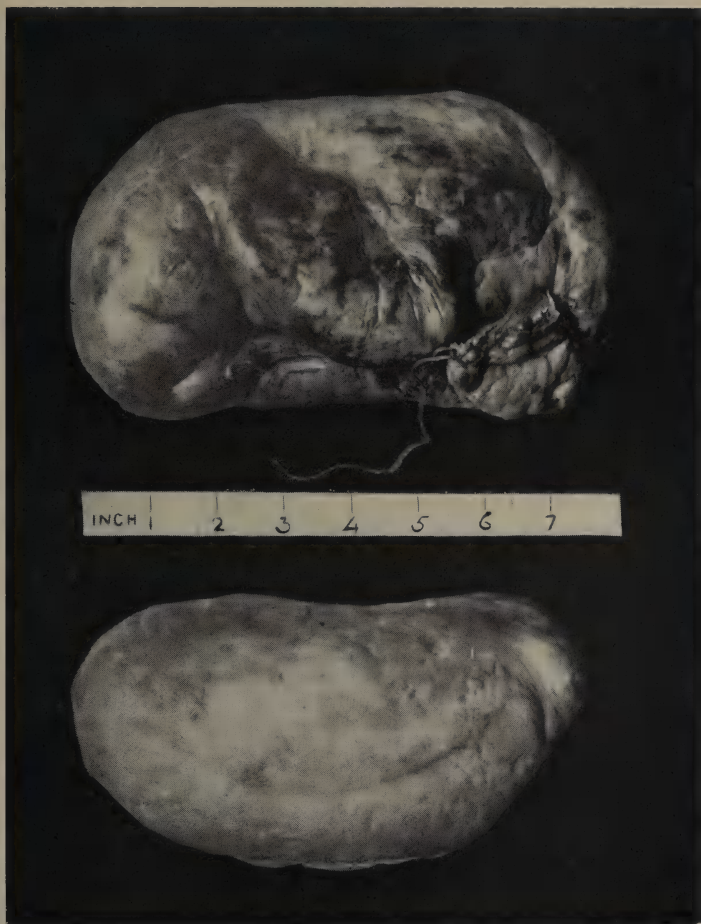
operation; 1 remained in good health, and had a child two years later; 1 died a few months later, another 18 months later from recurrence; 4 died within a year from dissemination of the growth.

On looking over the reports of the proceedings of obstetrical and pathological societies I cannot find any report of sarcoma of the ovary in the former, while in the latter Dr. Atthill reported a case on December 12th, 1874, but it seems to have been more of the fibro-cystic nature. The same may be said of a case reported by Mr. Hayes on February 15th, 1873, and one reported by Mr. Hayden on same date.

On 20th February, 1879, G. Seymour reported in the *Medical News* a case of a sarcoma of ovary forming a hernia in right inguinal region.

In 1888, in autopsies at Munich Medical University, Seeger discovered 4 cases of sarcoma of the ovary, one of which was round-celled sarcoma, the others spindle-celled.

The history of my case is as follows:—

E. M‘H., aged thirty-nine, was sent to the Coombe Hospital from Co. Fermanagh on 4th September. She was married for 13 years; had 7 children, last born March, 1896. Nursed her child for 1 year 9 months. Since weaning child menses have been regular every month, lasting two days, until last month (August), when she had only a sign; no dysmenorrhœa; no leucorrhœa. Bowels constipated. Patient was very much wasted, which she says has been going on for the last 12 months; has complained of aching pain in the small of the back, which shoots down the outside of the left thigh since April last. Had only noticed that the abdomen was enlarging for the last five weeks. Abdomen is enlarged in a globular or spherical form as high as the ensiform cartilage, distinctly fluctuating, but resonant along the sides posteriorly; well-marked dulness over the pubes. On the left side and in front there appears to be a solid mass freely floating in thin fluid; on the right side there seems to be a smaller tumour, also moving about in fluid.

Patient was very weak from emaciation. She was prepared in the usual way, and operation was performed on the 9th September. I was assisted by Dr. G. Cole-Baker. On making the incision the patient was so thin that no rectus muscle was seen at all—the whole thickness of the abdominal wall did not seem to exceed a quarter of an inch. When the peritoneal cavity was opened great quantities of ascitic fluid escaped. The left larger tumour then came into view. On being lifted up, the pedicle, which, of course, was short and very vascular, was transfixed, and tied with a Staffordshire knot. The silk used was best thick twisted. It cut through the tissues, which must have been infiltrated, and alarming hæmorrhage occurred. At one time it seemed as though it might have been necessary to apply the pressure of a Miculicz bag or tampon, and stop the operation. However, after several attempts the hæmorrhage was controlled. Having removed the larger of the two tumours, it was decided to remove the right one. This was done with much less difficulty from hæmorrhage, as care was taken not to draw the ligatures as tight as was done on the left side. Patient was in the Trendelenberg position. The peritoneum on the outer abdominal surface was infected, and so were the pelvic glands, the iliac glands, and the omentum. There was great difficulty in getting the sides of the incision to come together nicely on account of their being so thin. Convalescence was, practically speaking, uninterrupted. The stitches were taken out on the 19th (10 days after operation), and the union of the two sides of incision was perfect. About this time the patient suffered from a good deal of diarrhœa, and the ascitic fluid not only was returning, but there was also a feeling as if the extension of the disease to the peritoneum had rapidly increased. An enlarged gland made its appearance at the base of the neck on the left side, and gave rise to a great deal of pain. Patient was out of bed on one or two days, but gradually sank and died on the 15th October.

In this case it was evident the woman was dying, and it was thought operation, if successful, might at least lengthen her life. When the first ovary was removed I considered it better surgery to remove the other, even at the risk of hæmorrhage, before closing the abdomen. Indeed, as far as the operation goes there is not much to

interest. The patient's temperature for last three weeks
of her life varied from normal to 100°—rarely the latter.
The chief interest is in the tumours themselves and their
rarity.

From what I have quoted from different authorities it
would seem that the round-celled sarcoma is more usual in
early life, and the spindle-celled later on. These tumours
have been reported to be round-celled sarcomata by Dr.
Dargan. The weight of these tumours is as follows:—

> Left ovary   -   -   37 ounces.
> Right ovary   -   -   29   ,,

The measurements are as follow:—

> Left ovary { Length,   8 inches.
>   { Breadth, $4\frac{1}{4}$,,
>   { Thickness, $3\frac{1}{4}$,,
>
> Right ovary { Length, $7\frac{1}{4}$,,
>   { Breadth, $3\frac{1}{4}$,,
>   { Thickness, 3   ,,

In appearance they look like two large white kidneys.
I think it very likely that Dr. Smith's case differed from
these only in being a spindle-celled sarcoma instead of a
round-celled sarcoma, and that the hæmorrhage in his case
probably, as it did undoubtedly in mine, depended on
infiltration of the tissues with the extension of the new
growth.

The very excellent photos which I submit were kindly
taken by Dr. Alfred Scott, who has adopted the ingenious
method of photographing an inch scale along with the
tumours, thereby affording a very easy method of demon-
strating the size and comparative size of any pathological
specimens that may be photographed.

I have to thank the Section for their patient hearing,
and trust that the exhibition of these specimens may arouse
some discussion.

DR. SMYLY thought the most important point was to get absolutely clear of the disease if possible. If a microscopist were present at the operation, so that specimens could be examined on the spot, the operator could give a fair guess as to whether he had got outside the disease.

DR. COLE-BAKER said he had assisted at the operation, and he thought Dr. Kidd should be congratulated on his extreme pluck in removing the second ovary.

DR. MACAN said it would be interesting to know whether there was less danger of return in spindle-celled sarcoma than in the soft variety ; also whether there was greater likelihood of general infection in a case of malignant disease of both ovaries than where only one ovary was affected.

DR. KIDD, in reply, said he thought there was a better chance in the spindle-celled than in the other variety. It would be much more favourable if only one organ was affected. Where the two were engaged there was probably some general cause at work. Whenever the disease was found extending beyond the ovary the case ended disastrously.

NOTES ON A SUCCESSFUL CASE OF PAN-HYS-TERECTOMY PERFORMED ON THE PREGNANT UTERUS AT FULL TERM.

By F. W. KIDD, M.D.;

Master, Coombe Hospital.

MY reason for bringing this case before the Section in the form of a paper is that there might remain some record of it in the "Transactions" of the Academy. The necessary rarity of the operation is, I think, quite sufficient grounds for bringing it before you in this manner. The previous history of the case was as follows:—

Patient, M. N., came up to the Coombe Hospital at 9 30 p.m. on the evening of Sunday, the 14th January. She came from Johnstown, in Co. Kildare; was in charge of the district midwife, who, it appears, had never examined the patient, but whose services were simply requisitioned by Drs. Robinson and Waters to bring the patient up to Dublin in the train. Drs. Robinson and Waters had found the impossibility of delivering her in the country, and therefore sent her to Dublin. She was examined by Dr. Neill on admission. He found a tumour blocking up the whole of the true pelvis, the uterus moulded tightly on the body of the child, and barely room between the tumour and the symphysis to introduce two fingers side by side. Some presentation could be touched, but only high up; it seemed like an arm, but it was impossible to diagnose it with any certainty. Patient was "over forty" and a primipara. She had been in labour since early the preceding day. She was very thin and emaciated, was much worn out by the journey up. Membranes had been ruptured for some hours. Pulse was 120, and temperature 98°. On my arrival at the hospital I satisfied myself of the correctness of the diagnosis. The patient stated she had not felt any movement of the child for some days. On repeated examinations we failed to hear the fœtal heart. On thinking over the condition a complete hysterectomy seemed to be

the only means of delivering the child. The patient had been admitted into the maternity building in the first instance, so it was determined to perform the operation there on an improvised table. The patient was anæsthetised by Dr. Hughes, while I was assisted by Drs. Heuston, Scully, and Neill. As careful sterilisation of the abdomen as could be made in the time was done, and it was thoroughly scrubbed with ether before the operation was commenced. Patient had vomited once or twice before the operation, and, although her temperature was not up, seemed thoroughly exhausted. On palpating the abdomen it was found that there were other fibroid growths distributed over the uterus; one attached to the fundus of the uterus as high as the ensiform cartilage.

Operation.—A long median incision was made from a point about two inches above the pubis to a point about two inches above the umbilicus. With great difficulty the tumour was turned out of the abdominal cavity. The broad ligament on either side was first ligated, then the round ligament; the peritoneum, across the anterior and lower segment of the uterus, was then separated across from side to side above the bladder attachment, and the bladder well separated downwards. Then the uterine vessels were tied on either side; the vagina was then cut through, as near the presenting part as possible, and the uterus removed. The vagina was held up by a strong silk ligature, and the opening of the vagina was then stretched over, turning in the mucous surfaces. Laterally the anterior and posterior layers of broad ligament were brought together. In the middle line the peritoneum attached to anterior surface of the bladder was sutured to peritoneum on posterior wall of vagina, completely covering over the stump of the vagina. The pelvis was then quite clean and dry, and the ligatures tying the uterine vessels had been drawn down before peritoneum was stitched together over them. The abdominal wound was closed by silkworm-gut.

The after history of the case may be considered very satisfactory. After the operation she had no vomiting. The bowels moved slightly the night after the operation and well the next day; she passed urine herself at the same time. On the 19th, or the fifth day, temperature, which had been below 99°, went up to 100°. Patient's bowels moved rather frequently for some days, and there was a somewhat fœtid discharge from the vagina. To alleviate this warm boracic douches were given. Catheters had to be again

passed on the 20th and on the 22nd a watery secretion, smelling like urine, was noticed from the vagina. This became more distinct daily and lasted for a considerable time—in fact, was the only trouble she had. When she was removed to the chronic wards the dribbling still continued, but was not continuous; an examination by speculum revealed a silk ligature coming through vault of vagina, which was very much narrowed, and the urine evidently came down alongside of this. The urine finally ceased coming and the ligature came away. Patient had become plump and fat, and was sent home perfectly well, without any feeling of pain or discomfort.

In reviewing the history of the case I think we were very lucky to save the patient's life, as she had been so long in labour in the country, undoubtedly had been exposed to the risk of frequent examination, and then endured the fatigue of a fairly long railway journey. No other operation could have been done, as the vagina was too short to allow of a Porro's operation. Moreover, a hysterectomy was better when the patient had been so long in labour. As the specimen is now seen, of course, the child is much more protruded from the uterus than at the time of the operation. It has never been further expelled than it is at present. To Dr. McWeeney my thanks are due for the directions about the preservative fluid to try and maintain the appearance of the specimen as naturally as possible. Patient's temperature never exceeded 100°, except on the 13th day, when it reached 100·4°, and the pulse never was as rapid as before the operation.

The specimen will be permanently preserved in the museum of the Royal College of Surgeons.

The following method of preserving the specimen was adopted:—It was placed for 24 hours in the following solution: Formalin 10 parts, acetate of potash 15 parts, chloride of potash ·5 part, water 100 parts; then was changed into fresh solution for a further 24 hours; then put in solution of methylated spirit 80 parts, water 10 parts,

for a period of 24 hours, and in fresh solution for a further 24 hours; then placed in pure methylated spirit for 48 hours, and permanently preserved in glycerine 20 parts, acetate of potash 10 parts, water 100 parts.

Dr. Macan observed that the incision in the abdomen might have been smaller if the child had been treated like in a Cæsarean section from the first.

Dr. Smyly said that this case reminded him of a case in the Rotunda sent to him from Vincent's Hospital because operation on it would not be allowed there. He first did a Cæsarean section on it, and then he removed the uterus and the tumour. He was, in those days, in the habit of extirpating the cervix by the vagina, and on doing this he found that there was another uterus.

Dr. Kidd replied:—As to making a small opening and proceeding as in Cæsarean section, the indication was to remove the tumour as quickly as possible. They treated the child as if it did not exist. With regard to the length of the incision, it was the usual thing to make an incision extending an inch and a half or 2 inches above the umbilicus. Of course the longer the incision the more chance of a subsequent ventral hernia. The termination was satisfactory, and he had the patient under observation in hospital for a considerable time after the operation.

THE DUBLIN METHOD OF EFFECTING THE
DELIVERY OF THE PLACENTA.

By HENRY JELLETT, M.D., F.R.C.P.I.

IN 1876 two well-known medical writers[a] called attention to
the fact that the method of effecting the delivery of the
placenta by external manipulations, as opposed to its
manual removal or to its delivery by traction upon the
funis, had been first introduced in Dublin, and that it was
identical with the method of obtaining the same object
which had been introduced at a later date in Germany by
Credé, of Leipzig. In 1900, all German, and the great
majority of British, works on midwifery term this method
" Credé's method," while the few works which allude to the
fact that the Dublin School of Midwifery had any share
in introducing this most important improvement in the
management of the third stage, consider that there is a
difference between the " Dublin method" and " Credé's
method." The object with which this paper is written is
to prove the following propositions, and so to aid in restoring
to Dublin the credit of having introduced one of the most
important advances in midwifery which has been made during
the nineteenth century. These propositions are as follow :—

(1) That the method of effecting the delivery of the
placenta by external manipulations, as opposed to its manual
removal or its delivery by traction on the funis, was originated
in Dublin.

(2) That Credé's method, when originated *de novo* in
Germany, was identical in principle with the Dublin method,

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[a] M'Clintock and R. Barnes.

and that it rapidly came to assimilate itself to the Dublin method in its most important details.

(3) That, consequently, there is no difference between the Dublin method and Credé's method, and that inasmuch as the method originated in Dublin many years before the time that Credé discovered it for himself, its name is and ought to be "The Dublin Method."

In 1742 the first Dublin Midwifery was published by Fielding Ould, Man-Midwife, who subsequently, in 1761, became the second Master of the Rotunda Hospital—or, as it was then named, the Dublin Lying-in Hospital. In this work Ould calls attention to the fact that the immediate manual detachment and removal of the placenta after the birth of the child was not only unnecessary but dangerous, and as an alternative he recommends the following procedure:—"The Child must be laid on the Operator's lap, or on the Bed, as far from the Mother as the Length of the Funis will permit; which he must take in the right hand, about six Fingers' Breadth from the Pudendum, and roul it twice or thrice about his Fingers; then the first and second Fingers of the left Hand must be thrust into the Vagina, by its Direction; and the Patient stopping her Breath and forcing as if she were at stool; the Navel-string must be gently pulled forward as she forces, the Operator waiting rather for her Expulsion of it, than being too desirous to extract it; for pulling the Funis so as to extract the Placenta forcibly, may probably cause a Flooding; or perhaps break the Navel-string whereby the Placenta would be very difficultly brought forth; therefore let him just pull it sufficiently to make it incline forward, still insisting on the Patient's forcing down, which if she be not able to do of herself she must be compelled to it, by putting a Finger into her Throat, which will cause a Pressure of the Diaphragm, and the Muscles of the Belly,

by her Efforts to vomit; by these Means it is commonly brought forth in about five Minutes. When it comes away by Expulsion, it always is whole, but is subject to be broke, and part of it left in the Womb, if any violence be used for its Extraction." Here is the first recognition of the great principle upon which the Dublin method of effecting the delivery of the placenta is based—that *vis à tergo* is to be preferred to *vis à fronte* as a means of obtaining the delivery of the placenta, and also a recognition of the fact that the uterus should, if possible, effect the detachment of the placenta itself. In this connection it is interesting to note that Smellie, who read Ould's Midwifery and considered that it contained only "two good observations," recommends a similar manner of extracting the placenta, and in almost similar words, although Ould's remarks under this head are not included in the "two good observations;" from which I presume we may gather that Ould's work contains three "good observations."

The next work on midwifery which was published in Dublin (1781) is by "Edward Foster, Late Teacher of Midwifery in the City of Dublin," and a former Assistant at the Rotunda Hospital. He does not make any very explicit statements as to management of the placenta, but from what he does say it is evident that he profited by Ould's advice concerning the bad effects of too rapid manual extraction. In a list of the various "aids nature, in this important and astonishing operation" (of natural labour), "requires from art" he says:—"To direct the secundines in their expulsion, and perhaps to expedite it moderately by rolling the cord round the fingers of one hand, and pulling it gently and cautiously with the other." It is also evident, from the following remarks, that some idea was present in his mind, as to the value of friction and compression of the uterus, as a means of obtaining uterine

contractions. "Too sudden evacuation of the uterus and abdomen is an occurrence which sometimes happens. . . . The effects. . . . may be. . . . a flaccid and collapsed state of the uterus, unable to contract; and if the placenta be either partially or totally separated, a profuse and dangerous hæmorrhage. These are prevented . . . . . by immediately compressing the abdomen of the woman by the hands of an assistant, or by a proper bandage tied round the body, and by supporting her with moderate cordials." And in another place he says :—"In this case" (post-partum hæmorrhage), "as the danger is imminent, the relief should be speedy; and the indications are—1. To remove all hindrance to the womb's contraction, by extracting any extraneous body that may remain in it. And, 2. To promote it, with the contraction of its vessels, by a proper pressure on the abdomen. . . . ."

In 1783, two years later than Foster's work was published, William Dease, Surgeon to the United Hospitals of St. Nicholas and St. Catherine's, Dublin, published his "Observations in Midwifery," and in this work chronicles an important advance in the evolution of the "Dublin Method." His words are as follows :—"We should never in general attempt delivering the placenta until by feeling over the pubis we find the uterus in a round, hard state of contraction, that the woman has some pains, and that we find some part of it engaged in the os uteri so that it has been detached, and all we have to do is to favour its expulsion. Should the detachment of the placenta not be effected in the usual time, it will be much facilitated by the operator's applying his hand to the region of the uterus, which he may excite to the necessary contraction by gentle friction. . . . ."

Ould recognised that uterine contractions acting as a *vis à tergo* were to be preferred to manual removal acting as a *vis a fronte.* Foster recognised that pressure properly

applied could bring about the contraction of an abnormally flaccid uterus. Dease recognised the possibility of using this means of causing uterine contractions to effect the detachment of the placenta.

Joseph Clarke, who was Master of the Rotunda Hospital from 1786 to 1793, was credited by M'Clintock with having introduced into the Rotunda Hospital the use of manual pressure upon the fundus until the after-birth came away. Clarke's own remarks on the subject, in a Report of the Hospital which he published twenty-four years after he left it, are not very much more explicit than are those of Foster and Dease. He says:—"I have been for some years in the habit, not only of retarding the expulsion of the fœtus in these cases" (i.e., cases of uterine inertia), "but with a hand on the abdomen of pursuing the fundus uteri in its contractions until the fœtus be entirely expelled, and afterwards of continuing this pressure to keep it if possible in a contracted state. . . Labours conducted in this manner will be less liable to be followed by retentions of the placenta, by uterine hæmorrhage and by after-pains. In short, the safety and speedy recovery of a puerperal woman is most intimately connected with the gradual and perfect contraction of the uterus." As a re-sult of this treatment Clarke goes on to say that "in 10,387 cases in the Dublin Lying-in Hospital, only 21 had reten-tions of the placenta, requiring manual extraction, that is about one in 494."

Collins, who published "A Practical Treatise on Mid-wifery" in 1835, comes next in the list of Dublin writers on obstetrics. His directions with regard to the manage-ment of the placenta are most explicit. "The method which we pursue is as follows:—As soon as the head and shoulders are expelled, the left hand is instantly placed on the abdomen, immediately above the fundus uteri; thus following down, by a steady pressure, this organ as it con-

tracts, so as to bring it as low into the pelvis as practicable, without using violence. We keep up this pressure most diligently from five to ten minutes after the feet are expelled, and when the womb feels firm and well contracted we make the nursetender take our place, until the child is separated and the binder applied. If, however, the uterus does not feel firmly contracted after the separation of the child, we continue the pressure of the hand for some time longer until we have as far as possible effected our object; we then apply the binder." If hæmorrhage comes on, or if the placenta is retained for more than two hours, he further says:—"We must direct steady pressure to be made over the binder and make an examination to ascertain if the placenta be in the vagina or to be discovered at the mouth of the womb. . . . When the placenta can thus be felt and . . . it becomes necessary to remove it, we will find very gentle efforts with the fingers, at the same time making pressure over the fundus uteri, seldom fail in procuring its expulsion." That pressure was the recognised mode of obtaining the delivery of the placenta in these cases is evident from other remarks which he makes in describing cases of hæmorrhage or of retained placenta, especially from the very precise statement—"that in some cases of retained placenta active pressure was sufficient to cause its expulsion."

In 1848, M'Clintock and Hardy published their "Practical Observations on Midwifery." In this work we find the first clear and definite description of the Dublin method, although, as M'Clintock said some years afterwards in his notes to Smellie's Midwifery, this "way of getting off the placenta . . . has been practised from time immemorial at the Dublin Lying-in Hospital." M'Clintock's description is as follows:—"Having placed the hand on the fundus uteri, friction and slight pressure are to be made, and if the amount of contraction thereby induced is

not sufficient to repress the hæmorrhage, it will be neces-
sary to expel the placenta from the cavity of the uterus.
In doing this the organ must be grasped firmly, and
pressure exerted upon it in the axis of the brim of the
pelvis. If the uterus have fallen to the left side, as not
uncommonly happens, it must be raised into its natural
position before commencing to exert pressure upon it. It
will also tend much to the success of the manipulation if it
be performed during the presence of uterine action;
indeed we have sometimes been surprised at the ease with
which the placenta was pressed off during a contraction of
the uterus where previously it had withstood our best
directed efforts. These measures we have seldom found to
fail in getting away the placenta unless it is morbidly
adherent. . . . . . Perhaps it may be objected that
this mode of removing the placenta exposes the uterus to
injury, or may entail inflammation or other bad con-
sequences; but without attempting to deny that such
might be produced by violent or ill-directed efforts, or
from their being continued too long, we can only say that
in no case have we observed the practice to be followed by
any ill effects; and it must, we think, be conceded that
it is immeasurably safer to remove the placenta in this
way than by introducing the hand for its extraction." And
in another place he says :—" In compressing the uterus for
the purpose of extruding the placenta, or getting rid of
coagula, it is important for the success of the operation to
get the edge of the hand *behind* the fundus, and, grasping
the organ, to press *downwards* and slightly *backwards*.
Where this is duly attended to it will require little exer-
tion and a very trifling degree of pressure to effect the
desired object."

There is only one more extract, dealing with the origin
of the Dublin method, which need be brought forward. It
is taken from Sinclair and Johnston's "Practical Mid-

wifery," published in 1858, and containing an account of
the management of 13,748 deliveries which occurred in
the Dublin Lying-in Hospital between 1847 and 1854. It
is obviously impossible that Credé's teaching could have
had any effect on the Dublin School at the time this work
was written, as, although Credé taught his method clini-
cally from 1853 onwards, he did not bring it prominently
into notice until 1860. Sinclair and Johnston write as
follows:—"Generally speaking, the placenta was expelled,
or, in other words, the third stage of labour was concluded,
before a quarter of an hour had elapsed; frequently, how-
ever, not for twenty or thirty minutes. Should the placenta
have remained even over the period last mentioned, and
then have been readily pressed off, or discharged from
the uterus after the adoption of simple means, such as cold
and friction, the case was not viewed as one of retention
of the after-birth. When, however, a considerable period
had passed after the lapse of the half-hour, and the uterus
had failed in freeing itself of the remainder of its contents,
or when the adoption of the ordinary measures had proved
unavailing, and the placenta could not be pressed off, the
case was considered one of retention."

Here, then, is the evolution of the Dublin method of
effecting the delivery of the placenta. It is the same as
the method adopted in Dublin at the present day in its
principles. Slight changes in the carrying out of these
principles have been made from time to time, and will
continue to be made, but the method still remains the
Dublin method.

In 1853 Credé taught clinically the proceeding which he
considered offered the most suitable means of effecting the
delivery of the placenta. His words are as follows:—"We
apply the hand over the uterus after the expulsion of the
fœtus, and confine ourselves to making slight rubbing
movements over the greatest extent of the uterus possible;

then when we feel the uterus contract, we seize with one or two hands the fundus, and when the contraction arrives at its maximum intensity we press upon the fundus and on the walls of the uterus, at the same time driving it downwards into the small pelvis. All the after-birth and clots are expelled outside the genital organs, and the uterus comes back to its normal level. To press upon the uterus when it is not in a condition of contraction is a fault, and does not conduce to the required end." If the placenta was not expelled during the first contraction, Credé repeated the same manipulation during the second contraction, and similarly if necessary during the third and fourth.

In 1860 Credé brought his method prominently before the German medical world at a meeting of the Association of Physicians and Naturalists, held in Königsberg, and there he proposed, as a general rule, the principle which had been familiar for many years previously in Dublin, and on which the Dublin method and his own method were based. It is as follows:—"That in the treatment of the last stage of labour the practitioner should seek to effect the expulsion of the after-birth and membranes from the genital cavities by external manipulation alone, without interfering with the cord or introducing the fingers into the vagina" (Eastlake, Obstet. Trans., 1864). And, finally, a few years before his death, and influenced by the teaching of Schroeder, he recommended that the placenta should not be expelled for 30 minutes after the birth of the child.

The amount of confusion which has surrounded the interpretation of the term "Credé's method," as a result of attempting to attach unwarrantable limitations to the use of the term, is well shown by taking a paper which was read by Smyly at the meeting of the British Medical Association in 1885, in conjunction with Credé's words, as given by Smyly, and also in conjunction with a paper by Fisher in the *Russakaya Meditsina* for August, 1886. Smyly says,

" In Credé's method friction and pressure are more actively
carried out than in the Dublin method, and so the expul-
sion of the placenta is hurried." He also quotes Credé as
saying—"The uterus should expel the after-birth, and the
sooner it does it after the expulsion of the fœtus the better.
If it do not do so, it must be made to do so, otherwise it
may be too late, and the dangers of retained placenta come
into force." Fisher, who was assistant in the obstetrical
clinic of Professor Slavianski in Kharkoff, "made a large
number of observations with the object of determining the
relative advantages in the third stage of labour of Credé's
method of gentle manipulation or massage of the uterus,
and the method of forcible expression of the placenta by
powerful compression of the uterus." He came to the con-
clusion that puerperal complications were fewer after
Credé's method than in those cases in which the placenta
was expressed from the uterus. It is difficult to believe
that these sentences can apply to the same method. Smyly
considers that in Credé's method "the expulsion of the
placenta is hurried" more than in the Dublin method, but
Credé finally recommended to wait for thirty minutes
after the birth of the child before expressing the placenta,
while, according to Sinclair and Johnston, the Dublin
method effected the removal of the placenta in from
ten to twenty minutes. If, as Credé says, "the uterus should
expel the after-birth," it must be given an appreciable
interval in which to do so, but, if Credé's method is
more rapid than the Dublin method, there is no room for
any such appreciable interval. If in Credé's method
"friction and pressure are more actively carried than in the
Dublin method," while at the same time Credé's method
is the method of gentle manipulation or massage of the
uterus, what are the nature of the manipulations necessary
for the carrying out of the Dublin method? According to
M'Clintock, the Dublin method requires the uterus to be

"grasped firmly and pressure exerted upon it." Finally, if, in Credé's method, the placenta is never expressed from the uterus, what is Credé's method?

It is needless to quote any more of the widely divergent statements which are made by writers in obstetrics as to what does, and what does not, constitute Credé's method or the Dublin method, as it is clearly a case of *quot homines, tot sententiæ*. Still the solution of the question is not very difficult. The Dublin method is the method of pressing or squeezing off the after-birth by external compression of the uterus by the hand. "In doing this the organ must be grasped firmly, and pressure exerted upon it in the axis of the brim of the pelvis. . . . It will tend much to the success of the manipulation if it be performed during the presence of uterine action" (M'Clintock, 1848). Credé's method is the method by which the expulsion of the after-birth from the genital cavities is effected by external manipulations alone. "We seize with one or two hands the fundus, and when the contraction arrives at its maximum intensity we press upon the fundus and the walls of the uterus at the same time driving it downwards into the small pelvis" (Credé, 1853.) There may be a difference between these two methods. If so, it is a difference which neither Barnes nor M'Clintock was able to recognise. Barnes writes as follows in his "Obstetrical Operations":—"This plan of causing the uterus to contract and expel the placenta by manual compression has within the last few years been introduced into Germany, as a discovery, by Dr. Credé, without a suspicion, apparently, that it had long been a familiar practice in this country. It is insisted on with detail by Hardy and M'Clintock." While M'Clintock in his notes to Smellie's Midwifery says:—"A far safer and more efficacious way of getting off the placenta" (than traction on the cord) "is that which has been practised from time immemorial at

the Dublin Lying-in Hospital. . . . . This method, which may be justly called the Dublin method of expressing the placenta, will be found in many cases to obviate the necessity of its manual extraction. . . . Dr. Credé, of Leipzig, brought this method in 1860 prominently under the notice of German accoucheurs, at the meeting of the Association of Physicians and Naturalists held at Königsberg in September of that year."

I have traced the evolution of the Dublin method, and have compared it with the method originated by Credé. There can be no diverse opinions as to which is the older method, and if their similarity is not obvious it is owing to my failure to place the proofs of that similarity clearly before you, and not to the lack of proofs. The last proposition of the three which I started to establish follows consequentially on the establishment of the first two, and only requires to be a little amplified.

The method of effecting the removal of the placenta from the genital cavities by external manipulations, instead of by introducing the hand into these cavities, or by pulling upon the funis, was brought prominently before the notice of medical men in Dublin, twelve years before Credé brought the same method prominently before the notice of the medical world in Germany. In Dublin the method had been practised clinically at the Dublin Lying-in Hospital "from time immemorial." In Germany Credé had taught its value clinically for seven years. The term "Dublin method" is, therefore, the correct one to adopt in describing that method by which the delivery of the placenta is effected by external manipulations, as opposed to its manual removal or to its delivery by traction upon the funis.

BIBLIOGRAPHY.

Ould. "A Treatise of Midwifery." Page 57.
Smellie's Midwifery—M'Clintock's Ed. Page 74.

Foster, E. "The Principles and Practice of Midwifery, &c." Pages 140, 244, 261.

Dease, W. "Observations in Midwifery." Page 32.

Transactions of the Medical Association, Dublin, 1817. Page 369. Clarke, J. Medical Report of the Rotunda Hospital.

Collins. "A Practical Treatise on Midwifery." Pages 122, 123, 178, 151.

M'Clintock and Hardy. "Practical Observations on Midwifery." Pages 221, 224.

Sinclair and Johnston. "Practical Midwifery." Page 461.

Ribemont-Dessaignes et Lepage. "Précis d'Obstétrics." Page 516.

Obstetrical Transactions, London, 1864. Page 234. Eastlake "On the Management of the Third Stage of Labour."

Norris. "American Text-Book of Obstetrics." Page 378.

British Med. Journ., 1885, Vol. I., page 9. Smyly. "The Management of the Third Stage of Labour."

Lancet, 1886, Vol. II., page 543. "Credé's Massage of Uterus."

Barnes, R. "Obstetrical Operations," 3rd ed. Page 522.

Smellie's Midwifery—M'Clintock's Ed. Page 236.

DR. SMYLY said that they, as representing the Dublin school, should be thankful to Dr. Jellett for the proofs which he had brought forward. Nevertheless, he thought that there was a distinction between Credé's method and the Dublin method. The fault of Credé's method was that it was too active, and if they expelled the placenta too soon they might leave portions behind leading to post-partum hæmorrhage and sub-involution. In his work on midwifery, Professor Spiegelberg, who had seen both methods practised by the people responsible for them, Credé's by Credé, and the Dublin method when he visited Dublin, said the Dublin method was superior, because it was not so active, as it waited till the placenta had been expelled from the uterus, and it then expelled it from the vagina. Another point likely to be lost to the Dublin school was the method of preserving the perineum, generally known as von Ritgen's method, which undoubtedly originated in Dublin.

DR. COLE-BAKER took exception to the word "pressure" which was a vague term. Credé's method seemed to him one of the vaguest methods in the world, and in a paper of his, published in the *Dublin Journal of Medical Science* of December last, he asked what was Credé's method. Credé's method, as he took it, was squeezing the uterus, and making the placenta slip out, whether into or beyond the vagina, like an orange pip on being

squeezed out. Once the placenta has left the uterus it cannot be called a method of expression. If they push the uterus down, and thereby press out the placenta, it was a method of detrusion, not expression. Credé's method, he believed, was very much misunderstood.

DR. MACAN said the question was whether the Dublin method was, first of all, ever the same as Credé's, and if so which was the first in the field. He made this the subject of his Address at the Obstetrical Section of the British Medical Association held in Dublin in August, 1887. He proceeded to read paragraphs from this Address bearing on the matter. As far as he could see, the Dublin method differed in that, in it, the hand was applied to the abdomen, and pressure begun as soon as the child's head was born, the pressure being used to express the shoulders, and then continued to expel the placenta. He wished to emphasise the fact that the Dublin method begins before the third stage of labour—namely, the moment the child's head is born. He was convinced that in the great majority of cases the third stage of labour should be left alone as well as the second stage. He could not agree with the statement that Credé's method was vague.

DR. JELLETT, replying, said he could not see how Credé's method was more active than the Dublin method. At the start it was more active, but the Dublin method had changed. He thought Dr. Macan agreed with him that the title Credé's method should be applied to the general principle by which manual removal of the placenta was obviated. He had purposely in his paper omitted any reference to anything before the third stage, because there was an impression that the Dublin method included not only getting rid of the placenta but also expelling the child.

SECTION OF PATHOLOGY.

PRESIDENTIAL ADDRESS.

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[Delivered in the Section of Pathology, December 1, 1899.]

SINCE Behring and Kitasato's first article (1890) enormous advance has been made in the knowledge of toxins and antitoxins, and substances have been found which anta- gonise not only bacterial poisons, but poisons derived from the higher plants and animals. There is, however, an extraordinary similarity in the means by which all these substances are obtained; so much so that the same general description will apply to them all. *The blood serum of an animal artificially immunised against a given specific toxin will immunise other animals against the effects of the same toxin.* This is known as Behring's law. The sub- stance in the serum which is active against the toxin is the antitoxin. This name is, however, often applied to the serum itself, and the word toxin similarly has a double sense. It may mean the active principle—*i.e.*, that which acts on the tissues—or the medium in which that principle is found. This double use can hardly cause confusion once attention has been directed to it.

I wish, in this Address, to give an account of the present state of our knowledge with regard to two questions relating to these bodies. First, what is the source of anti- toxin? Second, how does it act? Before approaching these questions it would be well to make our conception of immunity a precise one.

We may first distinguish between natural and acquired immunity. Theoretically a natural immunity would be one in which an animal reacted to an injection, of a fluid containing bacterial or other poisons, on the living bacteria themselves, precisely as if an indifferent fluid were injected in the same quantity. This condition, if it exists at all, is rare. We should rather look on it in this way, that there are degrees of immunity, so that there is a scale for each poison, from the most resistant to the least resistant animal.

Acquired immunity may be produced either—

1. By taking the poison accidentally and recovering from it.
2. By inoculation in a less susceptible part of the body— *e.g.*, variolisation.
3. By inoculation with the attenuated organism, the attenuation being produced in various ways— *e.g.*, Pasteur's anthrax inoculation, Jenner's vaccination, Haffkine's cholera inoculation.
4. Small doses of the organism.
5. Toxins (or dead bacilli) in sterile medium—*e.g.*, Salmon and Smith, pigeons with hog cholera; Wright, typhoid inoculation.
6. Any of these (2–5) by the stomach (Ehrlich).
7. *Serum of immune animal* (Behring).

There is a marked difference which will at once strike you between the last of these methods and all the others. The first six methods are all methods of active immunisation; the last is a method of passive immunisation. If in treating a dyspeptic patient you were to stimulate the secretion of pepsin by the action of a drug you might be said to promote active digestion; if you introduced pepsin into the stomach before, with, or after the food, you might be said to induce passive digestion; and it is just the same with immunisation. In the first methods the body is in-

duced to form antitoxin by the action of small doses of toxin. In the latter case the antitoxin is introduced into the body ready-made. A further analogy between the two cases is that when your drug had done its work on your patient, and restored him to health, it might be discontinued, while the ready-made pepsin would have to be introduced at each meal. Similarly the immunity resulting from active immunisation lasts for a much longer time than that which is produced by the administration of antitoxin, as the antitoxin is excreted, if not used up by the toxin.

We may now turn to the first of the questions I have proposed to discuss, the source and nature of antitoxins. First, then, *How are antitoxins produced?* Bouchard and his school held that bacteria secreted the protective substances as well as the toxins. The facts that the toxins without the bacteria are sufficient to produce active immunity, and that the antitoxin so produced can go on increasing after all injection of toxin has ceased, are quite sufficient to make this theory untenable. To take one experiment out of many—A goat was immunised against tetanus by the injection of tetanus toxin. After the dosage with toxin ceased the antitoxic value of the serum was accurately estimated. Successive quantities of blood were drawn from the goat and replaced by the blood of a fresh goat which was known to have no antitoxic value. This went on until there was only $\frac{1}{12}$ of his original blood in the goat. After this had been done the antitoxic value was seen to rise gradually to double what it had been when the toxin dose ceased. This cannot be explained in any other way except by supposing that the toxin stimulates the cells of the body to produce the antitoxin, and that it is not the blood cells but the tissue cells that do so. When we come to inquire what the particular

cells are which produce antitoxin we are met by greater
difficulties. Tetanus affords the most promising field for
solving this question, because it is evident that tetanus
poison acts directly on the central nervous system. Now
Wasserman has shown that an emulsion of the brain of
an animal which is sensitive to tetanus has strong anti-
tetanic properties, while if the animal has been poisoned
by tetanus its brain loses this power. Here we have a
case of neutralisation of antitoxin by toxin, and this, not
in the serum, but in the brain cells themselves.

Other experiments tend in the same direction, and we
may say that, in the case of tetanus at all events, the
cells of the brain, which are those attacked by the toxin, are
also those which produce the antitoxin. It is easy to see
that such a thing is extremely hard to prove or disprove in
other diseases where no specific cells are specially attacked,
and, of course, the view goes counter to all the work of
Metschnikoff and his pupils on the protective action of
the wandering cells of the body.

We now come to the second question—*How do the
antitoxins act ?* Here, again, Bouchard held that the pro-
tective substances acted either by killing the bacteria or
by attenuating their growth or their virulence. This
theory receives support from the fact that bactericidal
or attenuating substances *are* found in many cases in
the blood of immunised animals in greatly increased
quantity, and, no doubt, this factor comes in largely in
recovery from disease. On the other hand, the bacilli of
tetanus and diphtheria, and the streptococcus pyogenes,
will grow quite well in their respective antitoxins, and
when filtered out, and freed from the antitoxic serum,
regain their virulence readily. Hence an antitoxin is not
necessarily a germicide, but, as its name denotes, an an-
tagonist to the toxin. Bouchard's theory is now quite

given up. But there are still two ways in which we may conceive this action—antitoxin may neutralise the serum, or it may immunise the cell.

A very hot controversy has raged between the supporters of these two theories. Behring was the champion of the first, Buchner of the second. At first the advantage seemed to be all on Buchner's side. Roux, arguing from the fact that a mixture of toxin and antitoxin which was neutral for a healthy guinea pig was toxic for one in which the resistance was weakened, gave the weight of his authority to Buchner's view. More recent work has been all in the opposite direction. By the methods of accurate determination of the toxic and antitoxic values of media which were introduced by Ehrlich, it was shown that Buchner's and Roux's supposed neutral mixtures were not really neutral, either because there was not enough antitoxin, or, as Cobbett showed lately, because they had not been allowed to stand sufficiently long; while the beautiful experiment of Martin and Cherry, which has been reproduced under more accurate conditions by Kanthack and Cobbett at Cambridge, goes far to settle the question definitely in favour of Behring's view.

Martin and Cherry, by choking a Chamberland filter with gelatine, produced a filter which was pervious to the toxin of diphtheria, but not to the antitoxin. They passed through this filter a mixture of toxin and antitoxin, which had been allowed to stand for some time, and found that the filtrate had no toxic properties. This could not have been the case unless the toxin had been neutralised by the antitoxin.

We may take it then as pretty well settled that the antitoxin acts by entering into chemical combination with the toxin, whether the action is outside or inside

the body. Lastly, it has been shown by Ransom that when an animal (pigeon) was poisoned by tetanus toxin in considerable quantity the toxin was found in all the tissues except the brain and cord, which are just the tissues attacked, so that the toxin, when combined with the cell protoplasm, is neutralised by it just as it is by the antitoxin.

Let us now collect the facts which have been established in the foregoing remarks and see if they do not lead naturally to a hypothesis as to the nature of the interaction of these bodies :—

1. The toxin enters into chemical, or molecular, combination with the cell protoplasm, and when in this combination is neutralised—*i.e.*, is innocuous for other cells.

2. The toxin enters into chemical combination with the antitoxin, and when in this combination is neutralised.

3. The antitoxin is produced by the cell, and is thrown off by the cell into the blood.

4. The cells which produce the antitoxin are the same cells as those which combine with the toxin.[a]

Now what could be more otiose than to suppose that the element in the blood which proceeds from the cell and neutralises the toxin in the blood is not the same element which neutralises the toxin in the cell. We are almost forced to the conclusion that it is the same. And so we arrive at the first part of Ehrlich's hypothesis, "That element, or group of atoms, in the cell protoplasm which combines with the toxin, when it is thrown off by the cell into the blood, *is the antitoxin.*"

[a] I do not mean to imply that all these facts stand on the same level as to the experimental evidence for them. There is strong evidence for the second and third. The first and fourth have some evidence in their favour, and it is in the direction of establishing or upsetting them that future experimental work on this subject must proceed.

But we have seen that it is the action of the toxin on the cell, and that only, which stimulates the cell to produce the antitoxin—that is to say, when any of the combining groups of the cell molecules are taken up by the toxin they are replaced by the cell, and replaced in very much increased numbers, as usually happens in all tissue regeneration.   Ehrlich supposes that these combining groups, when they become numerous, lose their hold on the cell molecules, and pass over into combination with the molecules of the fluid in which the cell is bathed, and so get into the blood, and that the injection of a given quantity of toxin will stimulate the cells to produce many hundred equivalents of antitoxin.

But there is more than this, for toxin does not merely combine with cell protoplasm, it also destroys it.   There is plenty of evidence to show that the part of the toxin molecule which poisons is not the same as that which first combines with the cell molecule.   The toxins of diphtheria and tetanus, when kept in the liquid state, gradually lose their toxic power down to a certain point, but they do not lose their power of combining with antitoxin.   It takes exactly the same quantity of antitoxin to neutralise a given quantity of toxin, no matter how long it has been kept, or how weak it has become.   So, in Ehrlich's terms, the haptophore group in the toxin molecule remains unaltered, while the toxophore group is changed.   Thus the toxophore group is much less stable, and less rapid in combining than the other, and hence is probably much more complex.

Let us endeavour to illustrate this idea by means of a chemical formula.   Suppose that the complex molecule of cell protoplasm contains the methylene group CH_2, the molecule being represented by X ; we have then $X.CH_2$ representing the cell molecule.   The methylene group has

a strong affinity for water (H.OH), which we may take as
the analogue of the *toxin*, and we may suppose that *in the
cell molecule* the water combines with CH_2 by means of its
hydrogen atom, while the hydroxyl (OH) combines with the
remainder X. If, however, the CH_2 group, having two
unsaturated affinities, be set free from the cell molecule, it
combines with both the H and the OH of the water, and
the cell molecule is thus protected from the toxin. The
equations representing these two actions would be—

$$
\begin{array}{ccc}
\text{X} & & \text{X—OH} \\
\| & & | \\
1.\ \text{H—C} + \text{H—OH} = & \text{H—C—H} \\
| & & | \\
\text{H} & & \text{H}
\end{array}
$$

2. $X + CH_2 + H.OH = X + CH_3OH$.
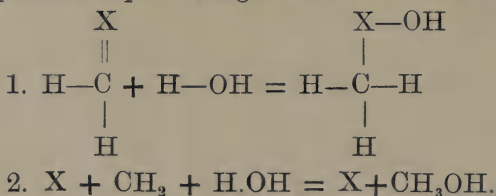
In Ehrlich's terminology, the H represents the *hapto-
phore*, or combining group, on the toxin molecule ; the OH
the *toxophore* or poisoning group.

Let us now further suppose that the cell molecule, when
attacked by the toxin in quantities too small to destroy it,
is stimulated to replace the saturated CH_2 groups, and that
these new groups, when produced in excess, tend to break
off from the cell molecule and to lie in the blood serum.
They can then combine with and neutralise the toxin in the
blood, and so prevent it from attacking the cell, as repre-
sented in equation 2. These CH_2 groups, when set free,
represent the *antitoxin*.[a]

There are many facts connected with the infectious
diseases which appear paradoxical, but which receive a
ready explanation by means of this hypothesis—*e.g.*, what
is a naturally immune animal ? A naturally immune
animal is one whose protoplasm molecule contains few or

[a] It must be understood that this is only meant as an illustration, and is not
intended to indicate the actual chemical process involved, about which nothing
is known.

none of the groups capable of combining with the toxin in question. Again, the incubation period of a disease, which appears in poisoning by toxins as well as by the living organism, is the time in which it takes the poisoning group to get to work after the toxin has been anchored on the cell molecule by its combining group. Again, it is found that the production of immunity and of antitoxin, although the cause of both is the same, do not at all run parallel to one another in amount. You may have an animal in the early stages of immunisation which is hypersensitive to the poison, while its blood is full of antitoxin; and, on the other hand, in the later stages animals are often found to be practically completely immune, while their blood yields no antitoxin at all.

As to the first case (Cobbett) the cells of hypersensitive animals are (on Ehrlich's hypothesis) actively producing combining groups which, as long as they are still attached to the cell molecule, form so many additional sources of infection. In the second case we may very naturally suppose that the power which the cell has of producing these groups is limited, and finally becomes exhausted, and the animal becomes the same as a naturally immune animal.

There are many other points of interest connected with this hypothesis, and especially in relation to the quantitative estimation of serum and toxin, but I will leave these questions untouched, being satisfied if I have put this somewhat complicated matter in such a way as to make it intelligible to those of you to whom it comes as a new idea.

PRIMARY SARCOMA OF THE LIP.

By R. CHARLES B. MAUNSELL, M.B., F.R.C.S.I.;
Surgeon to Mercer's Hospital, Dublin.

[Read in the Section of Pathology, December 1, 1899.]

I THOUGHT it might be of interest to briefly record the following case, considering the rarity of malignant growths of the lip in females, and the apparently extreme rarity of sarcoma in this situation in either sex :—

CASE.—Mrs. B., aged thirty-two, came to me on Aug. 28th, 1899, to ask my opinion about a warty growth on the left side of her lower lip.

Her family history was good, except that a maternal aunt died from cancer of the breast at the age of sixty-four.

She had been married a few years, and three months ago had been delivered of a healthy child. About the same time she noticed a small pimple on her lip; it was not sore, and caused her no trouble until six weeks ago, when it began to grow rapidly and bleed on the least irritation. A week ago she applied some blue-stone to it, by the advice of a chemist, but this made it much worse. She was positive that there had been no wart or mole on her lip previous to three months ago.

On examination she was a tall, dark woman, without a sign of disease other than that on her lip, except that her face was much discoloured by chloasma uterinum, which I subsequently learned from her obstetric physician had been very well marked during the period of gestation.

On the anterior surface of the red margin of the lower lip, at the junction of the middle and outer thirds on the left side, was a prominent wart-like growth about the size of a small hazel nut; its surface was covered by a thin scab of clotted blood; its base was slightly constricted; it was firm to the touch but not hard; its base did not feel deeply indurated, and there were no glands to be felt beneath the jaw or in the neck; there was no sign of inflammation in its vicinity.

Taking into consideration the sex and age of the patient, and

the situation of the growth, I did not think malignant disease very probable, but yet I considered the appearances sufficiently suspicious to demand excision and careful histological examination. I therefore removed it and submitted the specimen to Dr. H. C. Earl, who sent me the following report :—

" This tumour is a sarcoma. It is composed of round, oval, and spindle cells; it is traversed by a considerable number of vessels ; the part near its attachment to the lip is fibrous. The cells are chiefly short spindle cells."

On reading Dr. Earl's report, and seeing the sections, it struck me that I had never seen sarcoma mentioned as one of the diseases of the lips. I have looked up many of the chief surgical and pathological works on the subject, but so far have only found a reference to it in the 1898 edition of Duplay and Reclus' Surgery, where, in a short paragraph, they say that sarcoma of the lip is very rare, and quote two cases, one a melanotic sarcoma seen by Vidal, and one an " ordinary " sarcoma seen by Suttegast. They do not give any reference to the original description of these cases, but from the succeeding statement which they make, to the effect that the gum is likely to be involved at the same time, it is justifiable to doubt whether these cases were not the usual sarcoma of the gum, with involvement of the lip. Of course there is no reason, as far as I am aware, why a sarcoma should not grow from the lip as often as from any other part of the body, yet whether it be due to the lack of energy of surgeons and pathologists to record cases or not, the fact remains that none of our surgical works even mention the subject. I therefore record this case in the hope that it may induce others who may have seen cases to give details of them.

Dr. A. C. O'Sullivan inquired if he was right in taking it that the tumour was not pigmented.

Dr. E. J. McWeeney said that about a week ago a specimen was given to him in hospital from the lower lip of a child, aged ten years. The portion bore a growth, slightly ulcerated, about the size of a pea, roundish in outline, and suspected by the surgeon who had removed it to be a sarcoma. On section it proved to be a mixture of sarcomatous tissue, with dilated lymphatics and a considerable number of minute newly-formed capillaries. He reported it as being a lymphangio-sarcoma.

Dr. Maunsell, in reply, said that the tumour was not pigmented.

THE BACTERIOLOGY OF BERI-BERI, WITH SOME CLINICAL NOTES.

By P. N. GERRARD, B.A., B.Ch., B.A.O., M.D. Dub. Univ.;
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District Surgeon, Ulu Selangor, Federated Malay States.

I HAVE the honour to lay before you a short account of the researches into the causation of the disease commonly known under the name of "beri-beri," which it has been my good fortune to be enabled to investigate—although, I regret to say, in a cursory and incomplete manner—during the period of my residence at this station as District Surgeon. Before proceeding to the history of the cases and of the methods adopted by me in pursuing this inquiry, I desire to draw your attention to the fact that I have been influenced, indeed I may say led, to adopt these methods, chiefly by a careful perusal and digestion of the excellent memoir or report of Messrs. Pekelharing and Winkler, which they undertook on behalf of the Dutch Government in Sumatra some six years ago, and I desire, in the first place, to relegate to them the *kudos* which they so richly deserve, and furthermore to disclaim any idea of first hand originality in the production of results confirmatory in so many ways of those arrived at by these gentlemen.

During the early part of my residence in the tropics my efforts were devoted entirely to the examination of the fresh and stained blood, and the results derived therefrom need hardly be put down here ; suffice it to say, that I learned from those experiments that the micrococcus—for such I believe it to be—cannot be demonstrated with any distinct success on ordinary blood slides, stained or otherwise, without the

intervention of nutrient media and careful cultivation. The usual method of plating the cultures I later adopted, but owing to the extreme difficulty experienced in obtaining a plate which did not exhibit moulds and yeasts (so very common in tropical countries in the air) amongst the other growths on the plate, I ventured to try the effect of direct inoculation of sterile tubes of gelatin, agar, and potato. I then found that from a typical case of beri-beri only two growths showed themselves in the tube after inoculation ; these, when examined and stained, showed micrococci which stained clearly with the ordinary aniline dyes, carbol fuchsin and Loeffler's methylene blue, and no extraneous growth of any kind. I desire to submit here a slide, prepared from an agar tube, taken direct from the blood of Case 94, which is described below, from colonies which developed about 72 hours after inoculation of the tubes, and consisted of a white or pale citron coloured growth and a golden-tan coloured colony.

In order that the aseptic precautions taken in preparing these tubes and making the inoculations may be understood, the method adopted in obtaining the blood must be first described. This was carried out in the following manner : The tubes (previously plugged with sterilised wool and then sterilised again) were sterilised thrice after filling (the filtration of the agar having been carried out in the steam steriliser), they were then flamed at the necks, the plugs being thoroughly charred and then snuffed (with clean fingers) ; the washing of the patient's finger was begun first with soap and water, then ether ; the sharp needle sterilised (in the flame) and also the looped platinum needle, as usual ; the finger was pricked fairly deeply and the first drop of blood having been wiped off with a pledget of sterilised lint, the second drop was received in the loop of the needle without touching the finger, the plug removed

from the tube and the blood-bearing needle plunged into the nutrient medium; the tube once more plugged and placed in the incubator (consisting of a double sided tin box with water between, and a wick floating in cocoa-nut oil as a heating medium).

I shall now proceed to give the history of the first case investigated, which has been a most instructive one throughout. After the inoculation of the first tube from this case, in which the micrococcus appeared, the similarity of this micrococcus to the micrococci of suppuration prompted me to try the effect of an antitoxin with which you are all familiar—namely, antistreptococci serum—of which I had just received three tubes from Messrs. Burroughs and Wellcome; and beyond all doubt this patient, as I believe you will acknowledge from the notes on the case, did improve to some degree after this injection. The general bearing of this fact on bacteriology seems to me of some importance, and suggests practical questions of great weight—namely, What is the relationship, if any, between bacteria taken as a whole and individual members of the class? Is it possible that micrococci or bacilli which resemble each other are in reality related, and can they, under different circumstances, produce diseases which differ clinically? or, that the antitoxin of one can to a large extent affect the organism when present under a different symptomatic guise? That the antitoxin serum of the streptococcus did affect for good this case of beri-beri from which a pale citron coloured streptococcoid growth took place on gelatin, agar, potato, and sweet potato and in milk, is, I believe firmly, beyond all doubt. (I can find no account of any investigation of diphtheria cases which are followed by neuritis with regard to the presence or absence of micrococci locally.) Five days after his first injection his condition gave rise to grave apprehension, and he received another,

and my last, tube full, with the result that his voice improved markedly, his movements became more vivacious, and his wrist drop improved somewhat.   Had I more antitoxin by me now I should persist in the treatment, with a large amount of hope for the ultimate issue of the case; situated as I am, I can get no more for two months, and the effects of the last injection, I regret to say, appear to be "*wearing off*."   (I do not wish to lay any particular stress on this bacteriological heresy, but since the antistreptococcic serum is, I believe, amongst the latest treatment tried in this at present hopeless disease, I consider it right that I should mention the fact which led me to try it and its effect.

A curious fact also, in connection with this case, is that of three tubes inoculated two days after the last injection of antitoxin only one shows any growth, and that is a mixed growth, as obtained by Pekelharing and Winkler in some of their cases, a golden-tan coloured colony preponderating; at the same time the patient, formerly a mixed case, is now becoming distinctly a wet case, and the golden-tan coloured micrococcus has only just made its appearance.   I shall now proceed after this digression to the notes of the case, which are taken in the first instance by the Dressers, who follow the following list of questions invariably in these cases.

Has the patient—

1. Had fever or not.
2. Had beri-beri or not.
3. Had syphilis or not.
4. How long at present residence.
5. How long mines, road, &c., has been opened.
6. Previous member of *kongsi*[a] had fever or beri-beri.

[a] Large atap house.

7. Size of kongsi.
8. Number of inmates at kongsi.
9. Whether working in "lombong"[a] or "lampan."[b]
10. Character of site of kongsi, dry or swampy.
11. Food, good or not.
12. First symptoms.
13. Principal symptoms now.
14. Present condition as to anæmia, diarrhœa, pains, swelling, numbness, gait, appetite, tenderness in calves, reflex (patellar), strength of the hand grasp, palpitation.
15. Sensation to sharpness.
16. Sensation to bluntness.
17. Sensation to heat.
18. Sensation to cold.

Case I.—Leong Shin, Chinaman, Register No. 94, admitted 22nd January, 1899, age twenty-seven, miner (tin). Duration of disease, fifteen days. Patient has had fever; no syphilitic or previous beri-beri history; he has resided at the mines for three months; he states that none of his friends became affected; he cannot say how long the mines have been opened; the house was a large one occupied by 50 coolies and built on rising ground; the mining was on the "lombong" system and the food good; his first symptoms were fever and diarrhœa.

Principal present symptoms are numbness and weakness of the hands and legs, with "dropped wrist and foot," inability to walk and absence of the knee jerk. He is anæmic, has some œdema of the legs, tenderness of the calves, his hand grasp is weak, sensation to heat and cold normal in his legs and impaired for cold in his hands, sensation to bluntness and sharpness normal, and his face puffy.

His initial treatment was mistura ferri et strychninæ, oz. 1 ter in die.

[a] Deep mining.
[b] Surface mining.

24th January.—Agar tubes inoculated from the blood; 26th microcci found, 5 cc. antistreptococcic serum injected this morning.

27th.—No apparent change; this morning he got 10 cc. of serum.

29th.—His voice is somewhat better, otherwise much the same; there is some slight improvement in his appearance and vivacity generally.

31st.—In the afternoon his temperature rose to 99·2°; his breathing became rapid and shallow, 40 per minute, his pulse compressible and irregular; 1 30 p.m., 10 cc. serum injected and he showed a marked improvement within the next 24 hours; patient more lively and interested, movements quicker and voice improved.

5th February.[a]—His œdema began to increase and his condition returned to about the same as on admission, except that the case is now becoming distinctly a "wet case."

20th March.—Beri-beri Case No. 94 died last Monday, having become gradually weaker and more swollen for the past three weeks. On 5th an erysipelatous blush appeared on his back, at the lumbar region, which, in spite of rubbings and powder, and frequent changes of position, rapidly ulcerated, and just before his death had spread to an area of about 12 inches by 8 inches; his heart, which had kept wonderfully strong up to this point, began to fail, and he died on the night of 15th March of cardiac failure and asthenia, having been in hospital for 51 days, and 66 days from the commencement of his illness.

I think from the above notes the diagnosis of the case may be assumed absolutely to be beri-beri, and before proceeding to the description of the growths on the different culture media which this patient's blood yielded when taken by the method which I have already described, I would invite your attention to a few short notes on another case under consideration which has been a mixed case, inclined to be wet from the time of his re-admission for beri-beri—this patient having been originally admitted for remittent

[a] Interval 5 days.

Disease—Beri-beri. Name—Chau Meng. Age—Eighteen. Date of admission—23rd Jan., 1899. Result—Discharged cured, 11th May, 1899.

DATE	Jan. 30	31	February 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	March 1	2	3	4	5	6	7	8	9	10	11	12				
DAY OF DISEASE																																														

TEMPERATURE – FAHRENHEIT'S SCALE (107° to 97°) — Convalescence.

PULSE	M	108	116	100	106	90	108	98	98	100	90	96	94	96	88	90	90	87	92	92	88	96
	E		108	100	118	100	90	100	90	92	84	84	86	84	86	72	84	86	78	86	74	92
RESP.	M		37	25	25	22	27	22	24	25	20	24	22	24	22	22	23	23	26	22	24	22
	E	39	25	24	28	24	22	26	20	24	20	22	24	24	20	22	20	20	20	20	20	20
MOTIONS																						
URINE																						
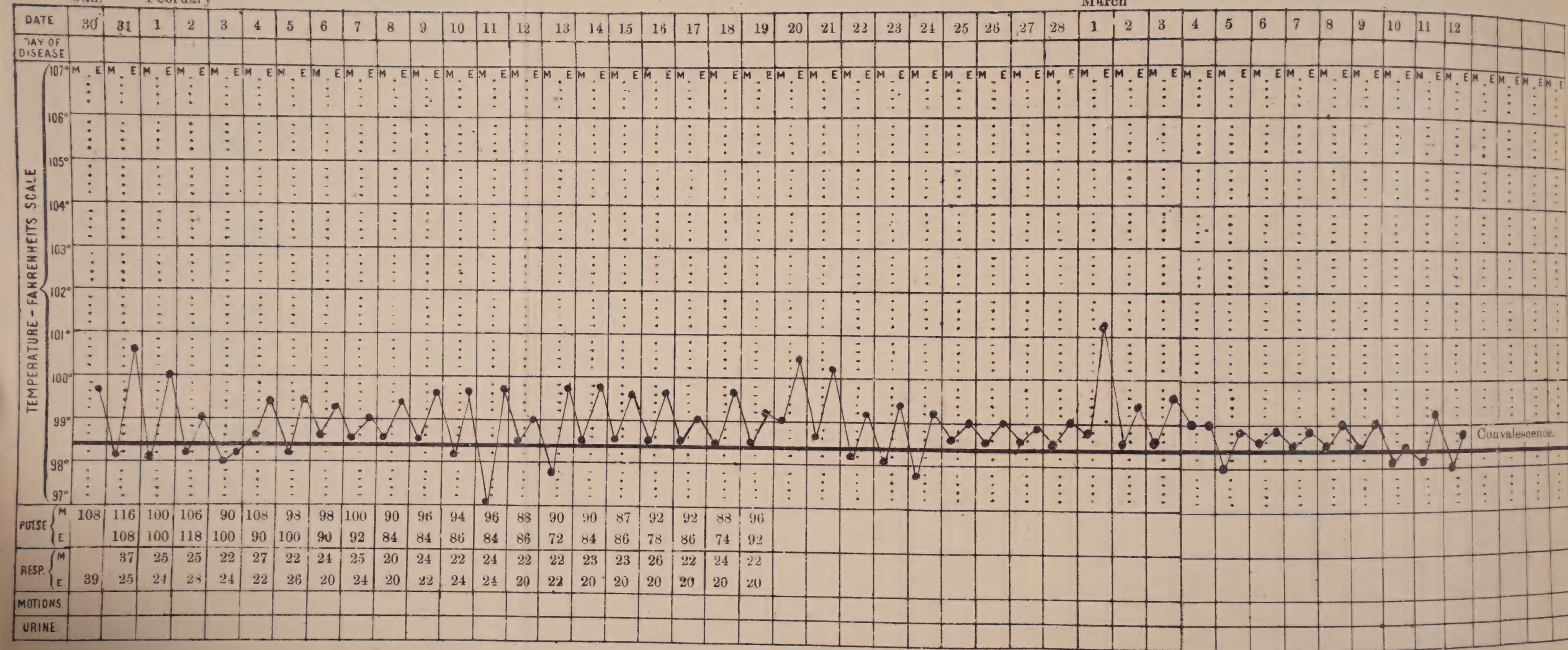
fever, which was cured by quinine, his temperature coming down to normal on the 29th December, nine days after his admission. He was then put on a tonic and remained in hospital to recuperate for a few days. He showed no progress, however, towards regaining strength; on the contrary, he began to complain of weakness in his legs and hands, and on the 23rd of January was re-admitted as a beri-beri case and found to have a temperature of 99·6°. His blood was examined for malarial parasites and none found. There were no beri-beri cases in the ward with him. His history, taken in a similar manner to Case 94, reads, from the time of his re-admission for beri-beri, thus:—

Case II.—Chan Meng, Register No. 98, admitted 23rd January, 1899, age eighteen, railway cooly; duration of present illness, fifteen days.

He has had fever, no beri-beri previously, no syphilis; one month at present residence; he works on the railway extension, lives in a large kongsi, which contains over 100 coolies, built on a small hill; food good.

His first symptom was continued fever. Present condition: his face is very puffed, he has dropped foot and wrist, absence of knee-jerk and inability to walk; anæmic; legs œdematous, and complains of weakness and numbness of his hands and feet; calves exquisitely tender, sensation otherwise normal; anorexia.

℞.—Mist. Ferri et Strych.

31st January.—Tubes inoculated.

2nd February.—Mixed micrococcus found,[a] pale citron and golden-tan coloured colonies. *Cf.* Case 98, original tube.

On 13th February I put him on a pill, which I have frequently prescribed with marked success in beri-beri:

> ℞. Strych. Hydrochloridi ... gr. 1/50
> Ext. Belladonnæ ... ... „ 1/8
> Ferri Sulphatis ... ... „ ii.
> Quininæ Sulphatis ... ... „ i.
> Extracti Gentianæ, q.s.
>
> Ft. pil, 1 ter in die.

[a] Probably mixed, white and tan.

This closes the history of this, the second, case, from whose blood I have isolated the micrococcus, and will, I believe, be sufficient evidence for anyone who has seen the disease to prove its identity (various minor alterations in symptoms or intensity which occur in cases of beri-beri I do not propose to enter into here, and I shall therefore close these preliminary, and I believe necessary, remarks, and proceed now to the more important notes of the results obtained on cultivation of the organisms from the blood). Since writing the above cases an exceedingly typical case of the acute disease has come into hospital, his blood "tubed" and the micrococci already referred to found after 24 hours. I may, perhaps, therefore be permitted to add a brief history of one more to the unbroken list of cases in which these organisms have been obtained from the blood.

CASE III.—Thoo Kim, Chinaman, tin miner, age twenty-three, Reg. No. 527, was admitted to hospital 28th April, 1899, complaining of extreme weakness of the legs, inability to walk, breathlessness and tenderness of his calves on pressure. The usual set of questions having been put elicited this history :—He has had fever but no beri-beri previously ; no syphilitic history. He has been working for the past six months at the mine, and states that none of his friends have had beri-beri ; the kongsi is large enough to accommodate 20 coolies, but only nine reside therein ; it is built on dry ground but near a river ; working the lombong system ; food ordinary. His first symptom was fever, followed by weakness in the legs with some swelling and heart palpitation. On examination his knee-jerk is absent, his calves are exceedingly tender, his sensation to sharpness is unimpaired on both legs, but to bluntness is lost over both tibiæ ; his sensation to heat is unimpaired, but to cold is lost; his muscles are apparently very relaxed, his wrists are paretic and he has ankle drop.

Finger washed with soap and water, ether and 1 in 40 carbolic, on 29th April, 1899, and three tubes taken as usual. After seven days no growth has shown. Five days after this inoculation, fearing that the carbolic lotion used might have been the cause

Disease — Beri-beri. Name — Theo Kim. Age — Twenty-three. Date of admission — 25th April, 1899. Result — Died, 15th May, 1899.

DATE

DAY OF DISEASE: 1 2 3 4 5 6 7 8 9 10 11 12 13 14

TEMPERATURE – FAHRENHEIT'S SCALE

107° 106° 105° 104° 103° 102° 101° 100° 99° 98° 97°

Diarrhœa.

More on 15th.

PULSE RESP. MOTIONS. URINE
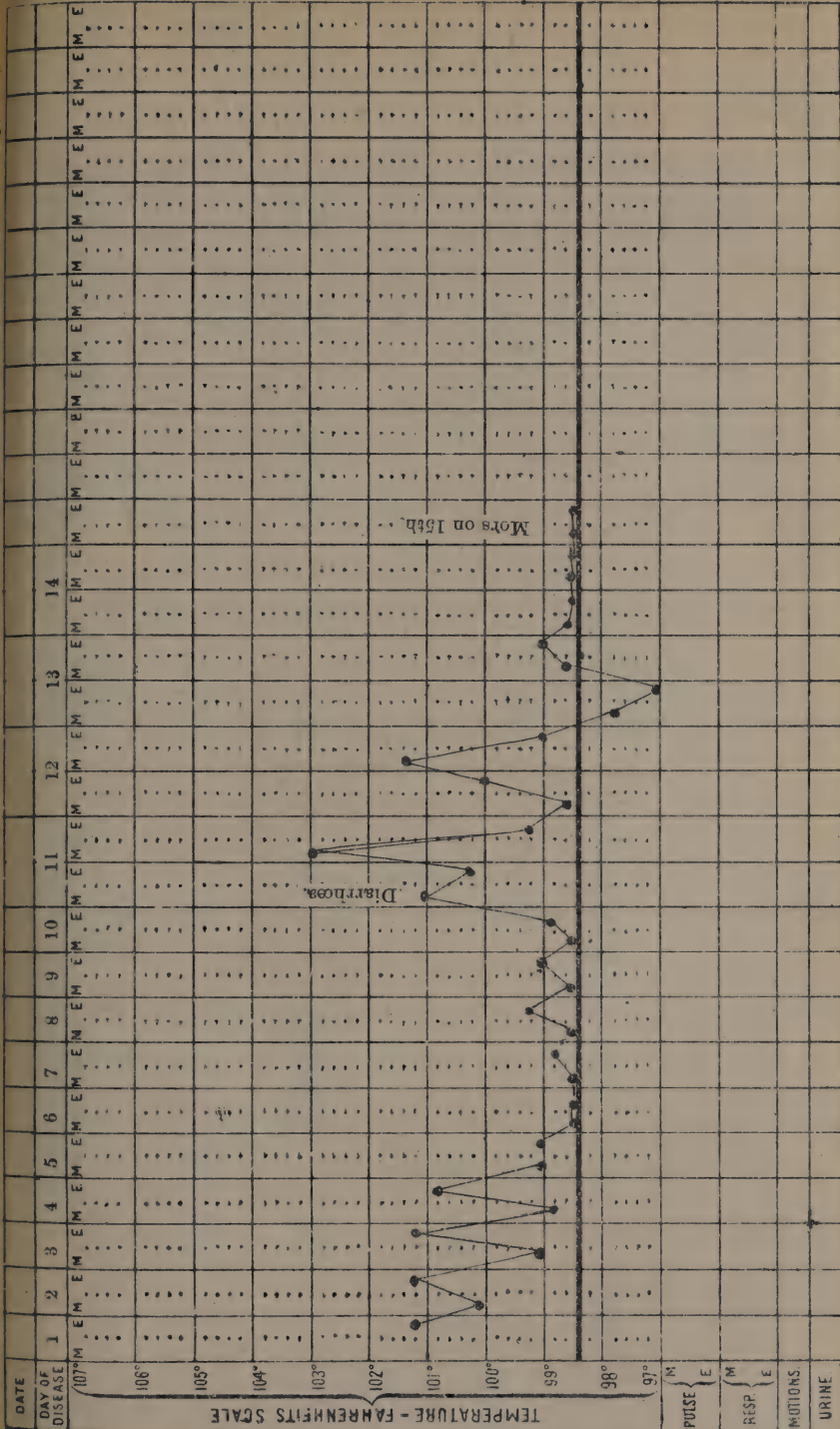
of the tubes remaining sterile, I again took the blood, having washed the finger very carefully with soap and water and ether; and having wiped off the first drop of blood with some sterile lint, I inoculated three more tubes, which, as I have stated above, after 24 hours showed both growths typically.

He was originally put on the pill mentioned before, but as the 1 in 40 carbolic had the effect of so thoroughly preventing growth in the first three tubes taken, and also considering that under similar circumstances I have failed to grow the micrococcus in another case in the first trial, I placed the patient on the following pill:—

R. Acidi Carbolici   ...   . grs. xxiv.
   Pulv. Glycyrrhizæ   ...   ...   ,, xlviii.

Ft. pil, xvi. 1 t. d. s.

The case is becoming progressively "wetter," and I cannot hope for recovery under any treatment, more especially as the breathing is much accelerated and laboured—May 11, 1899.

May 13, 1899.—Diarrhœa started yesterday; mist. creta c. opio and all other drugs suspended.   Patient died of diarrhœa.

The first account of the finding of the micrococcus I take direct from my bacteriological record. It was obtained from a previous case to these under discussion, which was typical in its tragic and sudden ending of the disease we are inquiring into. It was in a Malay, and the extract reads thus:—

Slide No. 11 a, stained specimen of growth from blood in nutrient gelatin; beri-beri case, died within 24 hours of admission; fairly well and eating his rice just when the blood was taken; died 12 hours afterwards while conversing with a friend in the ward. Diplococci, chain cocci and single cocci seen, some apparently capsuled; stained Loeffler.

I now propose to describe the growths under the headings of the nutrient media used.

*(Before Antistreptococcic serum) Nutrient peptonised agar,
direct original tubes.*

CASE 94.—Two vertical and two slopes inoculated.

Vertical No. 1.—Practically no result; that is to say, after
five days the blood streak in the agar had disappeared ex-
cept for a slight fluffiness towards the surface; in other
words, growth present but not in sufficient abundance to
slide.

Vertical No. 2.—A distinct and luxurious growth, the
needle puncture showing marked broadening and edges like
a cumulus cloud, and on the surface a citron-white opaque
film.

Slope No. 1.—Gave no strong growth.

Slope No. 2.—Gave a very faint whitish semi-opaque
film, which when slidden showed some micrococci as usual.

CASE 98.—*Same medium, direct original tubes.*

Agar-agar tubes taken on 31st January, 1899, two verti-
cal and two slopes.

Vertical No. 1.—The growth came on typically but slowly;
the agar then became dry and split in two along the line
of puncture, thus obscuring results, but the sub-culture on
agar is quite typical of the white colony, showing also some
golden-tan colonies.

Vertical No. 2.—Produced the usual growth, luxuriant
on the surface but thinning off into the depths.

The slopes as usual came on very feebly, and I did not
slide them.

Nutrient peptone gelatin, direct tubes.

CASE 94.—One tube only inoculated; shows signs of de-
velopment at the bottom of the tube but not on the surface.

The slides show a bacillus also, and I believe contamination has taken place, as slides off Case No. 98 in gelatin give typical micrococci.

Case 98.—One tube, which shows a white film with a great tendency to sink and a fairly luxuriant growth at the bottom of the tube.

Nota.—Both tubes are semi-liquid, although they set well after last sterilisation, probably owing to the high atmospheric temperature (room temperature about 88° F.). The gelatin is nevertheless sufficiently solid to support a growth on the surface, and I must conclude the micrococcus has the faculty of liquefying gelatin, which I can confirm from previous experience with gelatin.

Sub-cultures off original tubes from blood on potato.

Case 94.—Very distinct semi-transparent growth typical when slidden.

Case 98.—Two potato inoculations.
Tube No. 1.—Very distinct growth but fairly transparent.
Tube No. 2—Well-marked growth, opaque, whitish.

Sub-cultures on cladi (sweet potato).

Case 94.—One taken only ; no apparent growth.

Case 98.—Two, in one a whitish strong growth not well marked appeared, and in the second a similar indistinct growth took place.

Proceeding now to the tubes which were taken after the antistreptococcic serum had been administered, we do not find any very material difference in the mode of growth or appearance of the micrococci, save only that, as I have pre-

viously remarked, the golden-tan coloured micrococcus seems to grow more strongly since the injections than it previously did.

> *Nota.*—A direct original tube is a tube taken off the patient's blood.
>
> A sub-culture is a culture of such a tube not off the blood direct.

Post-antitoxin Direct Original Tubes.—Three tubes taken 6th February, 1899; in two the blood streak simply disappeared leaving one or two opaque spots along its track, probably groups of micrococci, but very badly marked; subsequently the agar split. In the 3rd tube two growths came on side by side, one apparently the usual pale citron micrococcus, and the other a golden-tan coloured growth. Subsequently (29th March, 1899) these micrococci cover the surface of the agar, the golden-tan predominating. I have commented on the coincidence of this appearance of a golden micrococcic growth when the case developed "wet" symptoms. A sub-culture No. 1 of this micrococcus is an excellent reproduction of the original post-antitoxin tube above, but colour is slightly lighter, the golden-tan predominating still.

Sub-culture No. 2 off Post-antitoxin Direct Tube No. 1.—Shows very luxuriant growth, but the pale citron now predominates, the golden appearing as a colony in the centre of the surface of the agar, which is covered, but for the centre, with the pale citron.

2nd Post-antitoxin Tubes Direct—Two tubes were inoculated direct on 23rd February, 1899, 24 days after the last injection of antistreptococcic serum; one failed and the other shows a luxuriant pale citron rather transparent growth down the sides of the agar, which split along the

line of inoculation, the micrococci growing down the sides.

3rd Post-antitoxin Tube Direct.—Two taken on 6th March, 1899, 35 days after antistreptococcic serum; one negative (blood plunged too deep?), the other shows luxuriant growth of pale citron coccus.

The following sub-cultures of the above (3rd post-antitoxin direct tube) two were taken on 6th March, 1899. One tube shows a typical and luxuriant growth of the pale citron micrococcus after 48 hours, but paler than the last tube. These tubes, 1st post-antitoxin, 2nd and 3rd, and the sub-cult of the 3rd, were all taken off Case 94, which became progressively wetter, and finally got an attack of erysipelas of the back without any apparent wound, then rapidly spreading, moist gangrene and diarrhœa, finally dying of cardiac failure and asthenia on 13th March, 1899, as previously stated. The micrococcus which appeared in this last tube was apparently more virulent, or at least quicker growing, than any of the others, and when sub-cultivated on agar the micrococcus appeared in strong growth, almost white in colour, within 48 hours of inoculation; no trace of golden growth in any of these tubes except the 1st, taken on 6th February, 1899, six days after the injection.

Milk Sub-cultures.—One tube inoculated from the original blood tube of Case 94; this failed to coagulate the milk, which was probably due to an insufficient amount of micrococcus having been introduced or some similar technical mistake, as the milk tube inoculated from the 1st sub-culture of this tube separated the milk distinctly, and yielded micrococci on the slide when examined.

Bouillon Cultures.—Three bouillon cultures were taken, on 21st April, 1899, off two different tubes showing the

micrococcus in strong growth. These tubes were—(1) the first agar sub-culture of an original blood tube off Case 94 (previously described); (2) a bouillon culture off the direct blood tube off which the above agar sub-culture was taken, also off Case 94; and (3) a bouillon culture of a later sub-culture than No. 1 above. All these tubes became cloudy after 48 hours, and in the course of a few days a white deposit began to be formed at the bottom of the tube. From subsequent observations of the behaviour of the micrococcus in bouillon, I am inclined to believe that the micrococcus developes chiefly on the surface of the bouillon, and eventually by its own weight sinks and settles on the bottom of the tube. Six other bouillon tubes were subsequently taken of typical agar tubes from this Case 94, and they behaved in an exactly similar manner to the first three; the deposit is not a sand-like deposit, but rather a ropy, mucus-like deposit; when examined, however, it presents absolutely no structure except the innumerable micrococci, which seem to be stuck to each other in masses and chains by a homogeneous ground substance.

Other bouillon tubes which were typical in appearance and when slidden are—(1) a bouillon culture off the first agar sub-culture of the original blood tubes from Case 94, and (2) a slide of a bouillon culture from the 3rd agar sub-culture of the original blood tube of Case 94. All these bouillon sub-cultures, whether taken from the direct blood tube in agar or from sub-cultures in agar off original tubes, show typical micrococci.

Other bouillon cultures were taken subsequently off agar cultivations from Case 527 (new case) and behaved similarly, and the above description applies to all bouillon sub-cultures which I have made.

CRITIQUE ON CASE 94,

The total number of tubes inoculated from this case was before the antistreptococcic injection 6, and after the serum 9, in 6 of which latter the pale citron growth appeared, 2 of which may be queried as the growth was not well marked, owing, I believe, to the fact that the sanguiferous needle was too deeply plunged into the agar and sufficient air was not permitted to reach it on account of the closing over of the puncture above. In 1 two growths appeared.

The appearance of a golden-tan coloured growth after the injection of antistreptococcic serum, and its tendency to reversion to the white growth later in the case, is worthy of comment and a point for future investigation. It is greatly to be regretted that, owing to the condition in which this unfortunate patient was when he died, he was buried by the hospital toties about six hours later and a *post-mortem* thus prevented. I regret also that my not possessing a camera precluded his being photographed, as a more typical wet case just before his death I have never seen. The paralysis of the legs and dropped foot persisted up to the date of his death, although the wrist drop improved, and power in the hands recovered somewhat from the date of the antistreptococcic serum injection; at least, it did not apparently progress proportionately.

The diametrically opposed case—namely, Case 98—which began as a mixed, with a tendency to the wet form, and which is now distinctly dry and recovering, is a very interesting and fortunate choice of cases, and it will be instructive to note whether the micrococci (for both the citron and tan appeared originally in this patient's blood) will disappear with convalescence, even as they become more virulent, more isolated, and whiter in the wet case who died.

Two tubes were taken off this case before he left hospital cured, which he did on 11th May, 1899; they both remained sterile.

CONCLUSIONS

(Subject to the fact that only seven cases have been threshed out in arriving at these conclusions, two of which however, were absolutely typical of two forms in which one meets the disease).

1. That beri-beri is a disease in which micrococci appear in the blood in all cases, which are capable of propagation outside the body on nutrient media of various kinds.

2. That, provided no extraneous infection of sterile media has taken place during the inoculation of these media with beri-beri blood, either or both of two forms of micrococci may present themselves—one showing a white colony on nutrient agar when in strong growth, pale appearance at first, and the other a golden-tan coloured colony.

3. That the organism which produces a golden-tan coloured colony is slightly larger than the white growth when slidden and stained.

4. That these organisms, or the toxins of these organisms, are capable of producing neuritis, with or without nerve degeneration.

5. That alterations in the course of the disease as to wetness or dryness may be connected in some way with predominance in the blood of one or other of the two forms of micrococci described (*cf.* Case 728, a dry case, from which one growth only appeared, the white colony.)

GENERAL CLINICAL REMARKS.

With regard to the clinical features of this disease so much has already been written by physicians of undoubted eminence that one feels somewhat diffident in making any

clinical remarks on the subject in connection with a bac-
teriological inquiry, but when the enormous importance of
the subject, more especially in the Malay Peninsula, is con-
sidered, one may be permitted to suggest slight alterations
or to make additions to the knowledge of such a vital subject.
In the first place, therefore, I think the presence of fever in
the early stages of a remittent type, and in more advanced
cases of a very irregular intermittent type, should be
remarked upon. I have had the opportunity of observ-
ing considerably over 2,000 cases during my term of office
in Ulu Selangor, and of these cases, according to the
answers given to the first question on the " Beri-beri Admis-
sion Question List," 76 per cent. show evidence in favour of
this view (*vide* Appendix I. attached, and the charts in
Appendix II. of cases from which the organism was
isolated). Another important question is what the pre-
dominant symptom next following the fever is? which I
find to be either numbness or weakness of the legs; at the
same time disturbances of the digestive system seem to
make their appearance, and frequently patients complain
of anorexia as amongst the first symptoms which lead them
to believe that there is something astray, and that a visit
to hospital would be advisable. I am given to understand
by the District Surgeon in charge of the Central Gaol at
Kuala Lumpur (Dr. M'Closky), that this is very frequently
a leading first symptom amongst incipient beri-beris in his
experience.

Another remarkable fact is the total anæsthesia to blunt-
ness and a hyperæsthesia to sharpness all over the legs,
and this is proportionately independent of the amount of
œdema present.

Lack of cold sensation appears to be fairly general, the
sensation for heat remaining, although as a rule, I consider,
delayed.

Tenderness on deep pressure on the calves of the legs is a sign on which too much stress cannot be laid. In some the tenderness amounts to exquisite pain on the slightest touch and in others is only faintly marked; as a rule, it is present. Absence of the patellar reflex is an absolutely constant sign when the disease has existed for a time, and, from the opinions of all medical men who have most experience, does not return with recovery.

Eye symptoms are not prominent, and I have not succeeded in finding any intraocular lesions. Aphonia in the paralytic cases is very constant.

The reflexes in incipient cases are, I believe, almost invariably exaggerated.

Muscular contractions, while not of rare occurrence, are nevertheless not a common sequela. At a rough estimate, I should say they occur in half per cent. of cases to some degree.

With regard to *post-mortem* appearances, ankylostoma may be found in some cases, but are not of very frequent occurrence.

A serum clot is very frequently present, and I have at present in my possession a clot which is an exact mould of the left ventricle and thoracic and abdominal aortæ, with extensions, some of over two feet in length, which extended into all the principal arteries down to the divisions of the common iliac. The theory suggested recently by Professor Romola, of Brussels, that these clots were due to the liberation of lecithin, from the breaking down of nerve tissue, I have not been able to investigate as yet; but it must, I think, be considered a possible, if not a probable, explanation of a very frequent *post-mortem* indication of beriberi.

I would now beg to submit—(1) a list of cases bearing

Beri-beri ——————   Rainfall ——————

| 1891 | 1892 | 1893 | 1894 | 1895 | 1896 | 1897 | 1898 | 1899 |
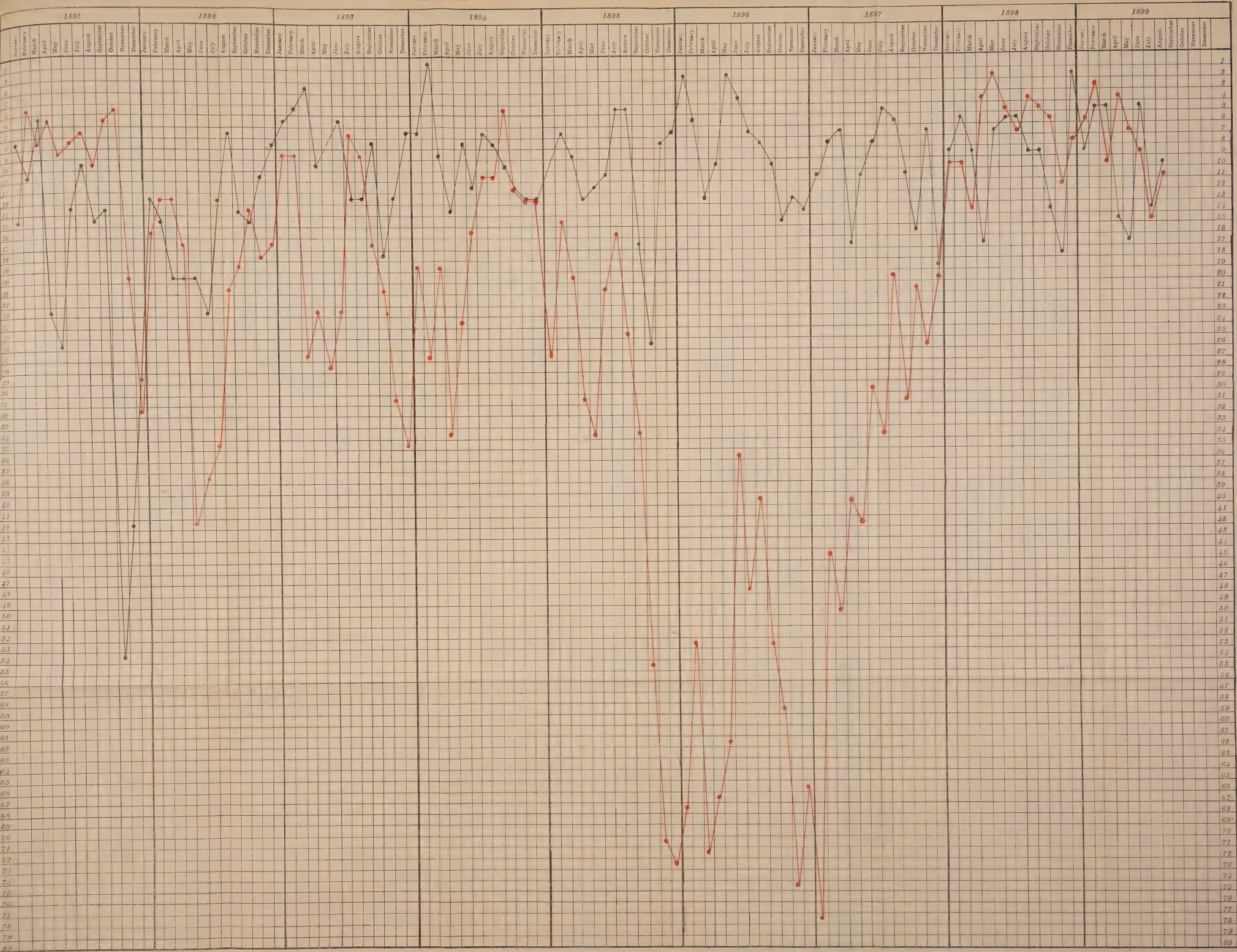
on the first symptom question; (2) a paper previously published, which may be of some interest on the relation of beri-beri to rainfall; (3) the history of one animal inoculated with the living cultivated micrococcus and from whose blood the micrococcus was recultivated ; (4) a few temperature charts.

APPENDIX I.

ANALYSIS OF CASES BEARING ON FIRST SYMPTOMS.

No.	Nationality	First symptom	How long ailing	Previous Beri-beri	Previous Syphilis	Previous Fever	Age	Result Died
		1897.						
1,290	Chinese	Small ulcer, then swelling of legs	20 days	no	no	no	24	22/9
1,349	,,	Dysentery 15 days, fever one month, ulcer on both feet, then œdema and numbness	30 days	no	no	yes	28	
1,335	,,	Numbness	2½ months	yes	no	no	57	26/10
1,323	,,	Swelling	20 days	no	no	yes	28	21/10
1,368	,,	Pain and swelling in epigastrium	6 months	no	no	yes	47	19/10
1,261	,,	Fever, then swelling	25 days	no	no	yes	41	18/10
1,371	Malay	Fever, weakness and numbness	20 ,,	no	no	yes	24	2/10
1,500	Chinese	Swelling	15 ,,	yes	no	yes	40	
1,489	,,	Fever	15 ,,	no	no	yes	32	
1,446	,,	,,	1 month	no	no	yes	32	
1,387	,,	Fever and giddiness	2 months	no	no	yes	26	

1,306	Chinese	Swelling of body	-	4 months	-	no	no	yes	40	
1,303	,,	Swelling, numbness and weakness	-	10 days	-	no	no	yes	23	
1,407	,,	Fever	-	? months	-	yes	no	yes	26	
1,315	,,	Swelling of face	-	23 days	-	no	no	no	45	
1,381	,,	Swelling of legs	-	1 month	-	yes	yes	no	50	
1,325	,,	Swelling	-	2 months	-	no	no	no	36	
1,336	,,	Tenderness of calves	-	18 days	-	yes	no	no	45	
1,406	,,	Fever	-	1 month	-	no	no	yes	24	
1,420	Malay	,,	-	3 months	-	no	no	yes	20	
1,415	Chinese	Pain in joints	-	15 days	-	yes	no	yes	24	
1,338	,,	Fever	-	15 ,,	-	no	no	yes	33	
1,843	,,	,,	-	2 months	-	no	no	yes	45	30/12
1,586	,,	Fever followed by numbness	-	10 days	-	no	yes	yes	28	25/12
1,363	,,	Numbness of hands	-	1 month	-	yes	no	yes	27	
1,557	,,	Fever	-	20 days	-	yes	yes	yes	19	22/12
1,768	,,	,,	-	7 ,,	-	no	no	yes	28	15/12
1,384	,,	Stiffness of hip joints	-	15 ,,	-	no	no	yes	28	7/12

Appendix I.—Continued.

Analysis of Cases bearing on First Symptoms.

No.	Nationality	First symptom	How long ailing	Previous Beri-beri	Previous Syphilis	Previous Fever	Age	Result Died
1,717	Chinese	Fever	10 days	no	yes	yes	31	4/12
1,896	,,	Dysentery	3 months	yes	yes	no	35	
1,711	,,	Fever, then œdema	2 ,,	yes	?	yes	?	
1,891	,,	Fever	2 ,,	no	no	yes	32	
1,372	,,	,,	15 days	no	yes	yes	33	
1,782	,,	,,	1 month	yes	no	yes	42	
1,698	,,	,,	15 days	no	yes	yes	23	
1,754	,,	,,	15 ,,	no	no	yes	32	
1,777	Malay	Fever 5 days, swelling and numbness	10 ,,	no	yes	yes	28	
1,724	Chinese	Fever	1 month	yes	no	yes	35	
1,310	,,	Œdema	20 days	no	yes	no	33	
1,709	,,	Dysentery	3 months	no	no	yes	28	

1,511	Chinese	Fever, sunburn and numbness	-	1 month	no	no	yes		58
1,731	,,	Fever	-	4 months	no	no	yes		25
1,456	,,	,,	-	1½ ,,	no	no	yes		44
1,673	,,	,,	-	3 ,,	no	yes	yes		30
1,644	,,	Fever, swelling and numbness	-	25 days	yes	no	yes		36
1,623	,,	Fever and numbness	-	8 ,,	yes	no	yes		46
1,575	,,	Fever and weakness	-	10 ,,	yes	yes	yes	27/11	48
1,499	,,	Fever	-	15 ,,	no	yes	yes	25/11	23
1,534	,,	Fever and numbness	-	1 month	no	no	yes	21/11	32
1,535	,,	,, ,,	-	1½ months	yes	no	yes	21/11	36
1,543	,,	Fever	-	6 ,,	no	no	yes	19/11	28
1,458	,,	,,	-	2 ,,	no	yes	yes	17/11	38
1,591	,,	Slight fever, swelling and weakness	-	2 ,,	no	no	yes	14/11	42
1,536	,,	Fever	-	1 month	no	no	yes	8/11	32
1,556	,,	Fever and numbness	-	6 months	yes	yes	yes	6/11	33
1,650	,,	Fever 6 days, then weakness	-	20 days	no	no	yes		45
1,703	Malay	Swelling and weakness of legs	-	20 ,,	no	no	no		28

Z

The Bacteriology of Beri-beri.

APPENDIX I.—*Continued.*

ANALYSIS OF CASES BEARING ON FIRST SYMPTOMS.

No.	Nationality	First symptom	How long ailing	Previous Beri-beri	Previous Syphilis	Previous Fever	Age	Result Died
1,645	Chinese	Fever	13 days	no	no	yes	24	
1,355	,,	Giddiness	1 month	no	no	yes	30	
1,641	,,	Fever, weakness, numbness and swelling	2 months	yes	no	yes	31	
1,581	,,	Fever and swelling	13 days	no	no	yes	25	
1,113	,,	Fever	2 months	no	no	yes	31	
1,419	,,	Fever and numbness	4 ,,	no	no	yes	45	
1,550	,,	Dysentery and fever	2 ,,	no	no	yes	24	
1,388	,,	Swelling	1 year	no	no	yes	27	
1,508	,,	Numbness of body	10 days	yes	no	yes	26	
1,385	,,	Numbness	2 months	no	no	yes	27	
1,443	,,	,,	20 days	no	no	no	32	
1,752	,,	Numbness and swelling	1½ months	no	no	no	24	

No.	Race	Symptoms			Duration				Age	Date
1,914	Chinese	Fever, then swelling	-	-	40 days	no	no	yes	28	18/1/'98
1,887	,,	Fever	-	-	2 months	no	no	yes	27	1/1/'98
1,869	,,	,,	-	-	1 month	no	no	yes	26	
1,816	,,	,,	-	-	1½ months	no	no	yes	31	
1,907	,,	Fever and numbness	-	-	20 days	no	no	yes	24	
1,640	,,	Fever, weakness and numbness	-	-	10 ,,	yes	yes	yes	30	
1,577	,,	Bubo, fever, inability to walk	-	-	15 ,,	yes	no	yes	28	
1,918	,,	Fever	-	-	1 month	no	yes	yes	22	
1,334	,,	Pains in joints and numbness	-	-	10 days	yes	yes	yes	40	
1,866	,,	Dysentery and fever	-	-	23 ,,	no	no	yes	46	
1,609	,,	Fever	-	-	15 ,,	no	no	yes	39	
1,505	,,	Fever and diarrhœa	-	-	15 ,,	no	no	yes	24	
1,812	,,	Fever	-	-	15 ,,	no	no	yes	30	
1,639	,,	Fever and numbness	-	-	15 ,,	yes	no	yes	27	
1,317	,,	Ulcer, then numbness	-	-	15 ,,	yes	no	no	30	
1,280	Malay	Fever ,,	-	-	1 month	no	no	yes	26	
1,478	Malay	Weakness of legs	-	-	3 months	no	yes	yes	35	
1,300	Chinese	Slight increasing numbness	-	-	4 ,,	yes	yes	no	50	

APPENDIX I.—*Continued.*

ANALYSIS OF CASES BEARING ON FIRST SYMPTOMS.

No.	Nationality	First symptom	How long ailing	Previous		Fever	Age	Result Died
				Beri-beri	Syphilis			
		1898.						
15	Chinese	Fever	1 month	yes	no	yes	38	14/2
21	,,	,,	1 ,,	no	no	yes	27	
52	,,	,,	20 days	no	no	yes	32	
101	,,	,,	3 months	no	no	yes	34	28/3
118	,,	Swelling with fever	50 days	no	no	yes	39	
123	,,	Swelling and numbness	2 months	yes	no	no	42	
143	,,	Fever	7 days	yes	yes	yes	24	
157	,,	9 days fever, then weakness	9 ,,	?	?	yes	28	2/2
167	,,	Fever	15 ,,	no	no	yes	17	
174	,,	,,	1½ months	no	no	yes	35	
177	,,	,,	4 days	no	no	yes	40	

No.	Nationality	History							Duration	No.	Ratio
224	Chinese	Swelling	-	-	-	no	no	no	6 months	31	
254	"	Fever	-	-	-	yes	no	yes	2 "	39	4/3
293	"	Fever and swelling	-	-	-	yes	no	no	4 "	38	
348	"	" followed by swelling	-	-	-	yes	no	no	1 month	32	1/3
349	"	" with numbness	-	-	-	yes	no	no	1 "	25	
350	"	?	-	-	-	?	?	no	1 "	37	
357	"	Swelling	-	-	-	yes	no	no	15 days	40	2/4
354	"	Fever then numbness	-	-	-	yes	yes	no	?	27	
395	"	Fever	-	-	-	yes	yes	no	4 months	30	18/3
401	"	"	-	-	-	yes	yes	no	10 days	33	
418	Malay	Numbness from knees	-	-	-	no	yes	no	1 month	27	
420	Chinese	Fever	-	-	-	yes	no	no	2 months	30	
427	"	"	-	-	-	yes	no	no	1 month	38	
428	"	Fever then numbness	-	-	-	yes	yes	yes	20 days	23	
492	"	Diarrhœa	-	-	-	no	yes	yes	10 "	32	3/6
501	"	Fever then numbness	-	-	-	yes	no	no	1½ months	28	
515	"	Fever	-	-	-	yes	no	no	3 "	34	

APPENDIX I.—*Continued.*

ANALYSIS OF CASES BEARING ON FIRST SYMPTOMS.

No.	Nationality	First symptom	How long ailing	Previous			Age	Result Died
				Beri-beri	Syphilis	Fever		
526	Chinese	Fever then numbness	12 days	no	no	yes	31	
551	,,	Fever	15 ,,	yes	yes	yes	35	19/7
552	,,	,,	15 ,,	no	no	yes	22	
632	,,	,,	1 month	no	yes	yes	26	
651	,,	,,	20 days	no	no	yes	20	
668	,,	,,	1 month	no	no	yes	35	13/6
704	,,	,,	1½ months	no	yes	yes	33	
728	,,	,,	13 days	no	no	yes	23	14/5
745	,,	,,	1½ months	no	yes	yes	35	
822	,,	Œdema and numbness	14 days	yes	no	no	26	
974	,,	Fever	2 months	no	no	yes	32	
975	,,	=	5 days	no	no	yes	29	

1,008	Chinese	Fever	-	-	-	-	25 days	yes	no	no	28	16/7
1,017	,,	Numbness	-	-	-	-	8 ,,	no	yes	no	60	
1,059	,,	Fever	-	-	-	-	10 ,,	yes	no	no	28	
1,097	,,	,,	-	-	-	-	1 month	yes	no	no	40	
1,108	,,	,,	-	-	-	-	15 days	yes	no	no	24	14/9
1,128	,,	,,	-	-	-	-	2 months	yes	no	no	37	
1,138	,,	,,	-	-	-	-	20 days	yes	no	no	40	23/7
1,150	,,	,,	-	-	-	-	2 months	yes	no	no	30	
1,151	,,	Swelling	-	-	-	-	2 ,,	yes	yes	no	34	
1,185	,,	Fever	-	-	-	-	10 days	yes	no	no	23	
1,266	,,	Swelling	-	-	-	-	1 month	no	no	no	26	
1,267	,,	Fever	-	-	-	-	15 days	yes	no	no	24	
1,274	,,	,,	-	-	-	-	10 ,,	yes	no	no	23	
1,390	,,	,,	-	-	-	-	1 month	yes	no	no	37	30/8
1,409	,,	,,	-	-	-	-	15 days	yes	no	no	26	
1,433	,,	,,	-	-	-	-	15 ,,	yes	no	no	28	
1,443	,,	Gradual numbness	-	-	-	-	40 ,,	no	no	no	40	

APPENDIX I.—*Continued.*

ANALYSIS OF CASES BEARING ON FIRST SYMPTOMS.

No.	Nationality	First symptom	How long ailing	Previous Beri-beri	Previous Syphilis	Previous Fever	Age	Result Died
1,502	Chinese	Fever	12 days	no	no	yes	35	
1,503	,,	Pain and swelling of abdomen	1 month	no	no	no	46	
1,552	,,	Numbness	6 days	yes	no	yes	31	
1,579	,,	Fever	3 months	no	no	yes	40	
1,598	,,	Numbness and paralysis	15 days	no	no	no	45	18/11
1,619	,,	Fever	15 ,,	no	no	yes	20	
1,631	,,	▪	17 ,,	no	no	yes	32	
1,673	,,	Swelling and asthenia	1 month	no	no	yes	45	
1,705	,,	Fever	20 days	no	no	yes	39	
1,731	,,	,,	5 months	no	no	yes	24	
1,741	,,	,,	25 days	no	no	yes	40	12/11
1,784	,,	,,	10 ,,	no	no	yes	38	

No.		Date				Duration				Numbness	Fever	Race
1,785	27		no	no	no	15 days	-	-	-		Fever	Chinese
1,793	29	9/12	yes	no	no	30 "	-	-	-		"	Malay
1,800	36		yes	no	no	30 "	-	-	-		"	Chinese
1,806	26		yes	yes	no	18 "	-	-	-		"	Malay
1,813	30		yes	yes	no	20 "	-	-	-		"	Chinese
1,817	25	1/12	yes	no	no	10 "	-	-	-		"	"
1,838	28		yes	no	no	3 months	-	-	-		"	"
1,846	50	7/12	yes	no	no	20 days	-	-	-		"	"
1,870	25		yes	no	no	1 month	-	-	-		"	Malay
1,882	36	18/12	yes	no	no	15 days	-	-	-		"	Chinese
1,883	29		yes	no	no	10 "	-	-	-		"	"
1,884	30		yes	no	no	15 "	-	-	-		"	"
1,894	19		yes	no	no	15 "	-	-	-		"	"
1,896	51		yes	no	no	1 month	-	-	-		"	"
1,983	28	1/1/99	yes	no	no	6 days	-	-	-		"	"

APPENDIX I.—*Continued.*

ANALYSIS OF CASES BEARING ON FIRST SYMPTOMS.

1899.

No.	Nationality	First symptom	How long ailing	Previous Beri-beri	Previous Syphilis	Previous Fever	Age	Result Died
34	Chinese	Fever	3 months	no	no	yes	40	
38	,,	,,	1½ ,,	no	no	yes	31	
94	,,	,,	15 days	no	no	yes	27	13/3
95	,,	,,	1 month	no	no	yes	19	
98	,,	,,	15 days	no	no	yes	18	
186	,,	,,	2 months	no	yes	yes	40	26/2
170	,,	,,	25 days	no	no	yes	38	
142	Malay	,,	4 ,,	no	no	yes	20	
251	Chinese	,,	20 ,,	no	no	yes	49	
254	,,	,,	5 ,,	no	no	yes	23	6/3
263	Javanese	,,	2 months	no	no	yes	33	
343	Chinese	Fever and pain in bones	5 ,,	no	no	yes	43	

No.	Race	Symptoms	Duration				Age	Date
499	Chinese	Pain in feet	1 month	yes	yes	no	40	
471	,,	Fever	20 days	no	no	yes	28	13/5
554	,,	,,	8 months	yes	yes	yes	46	
566	,,	,,	18 days	no	no	yes	24	9/6/99
590	,,	,,	10 ,,	no	yes	yes	30	13/5/99
650	,,	,,	4 months	no	yes	yes	23	27/5/99
654	,,	,,	10 days	yes	no	yes	32	
693	,,	Swelling started on his legs	15 ,,	yes	yes	no	35	
713	,,	Fever	1 month	no	no	yes	28	
728	,,	Fever and numbness	1 year	no	no	yes	28	
761	,,	Fever	2 months	—	—	—	29	11/6/99
814	Tamil	Pain in the lumbar region followed by numbness	4 ,,	no	yes	yes	35	
850	Chinese	Fever	6 days	no	yes	yes	28	
856	,,	,,	14 ,,	no	no	yes	48	
864	,,	,,	2 months	yes	no	yes	33	
888	,,	,,	1 month	yes	no	yes	38	6/7/99
894	Malay	,,	1 ,,	no	no	yes	30	
901	Chinese	,,	1 ,,	no	no	yes	31	
903	,,	,,	2 months	yes	yes	yes	52	

Year	Cases	Deaths	No. complaining of fever as first Symptom	No. previously had Beri-beri
1897	87	22	59	25
1898	84	23	69	7
1899	31	9	27	9
Total -	202	54	155	41

Mortality - - - - - 26·7 per cent.

Number of cases complaining of ⎱
    fever as their first Symptom ⎰ - - 76·7 ,,

Previously had Beri-beri   - - - 20·2 ,,

Appendix II. (*vide* Supplementary Chart).

THE INFLUENCE OF RAINFALL ON BERI-BERI.

The prevailing opinion amongst the members of the Profession practising in the Malay Peninsula, so many as I have had the pleasure of meeting, where the disease causes such a very large number of deaths yearly, seems so much in favour of the supposition that beri-beri cases occur more frequently after a wet month, or that the severity of the cases is increased after wet weather, has led me to collect the cases occurring in my district, Ulu Selangor, Malay States, for the past seven years.[a] I now desire to submit a chart of the rainfall, and beri-beri admissions, for analysis, and, I hope, remarks from other medical men who have had to deal with this most interesting, and I think I may say badly understood, disease. The total number of cases in the chart amount to 2,422,[b] extending over 84 months—from February, 1891, to December, 1897, inclusive.

The numbers on the left hand side of chart represent inches of rainfall, or number of admissions per month, according to which line you are following, the colours distinguish the subject which is being followed on the chart.

Calling the months in which a rise or fall of rainfall was followed by a similar rise or fall of beri-beri admissions positive evidence, and the contrary negative, I find that of—

[a] Two years more appear in the chart.
[b] Now 2,567.

Months		Positive		Negative	Months	Positive		Negative
6 Januaries	-	3	-	3	7 Augusts -	2	-	5
7 Februaries	-	1	-	6	7 Septembers	4	-	3
7 Marchs	-	3	-	4	7 Octobers -	4	-	3
7 Aprils	-	3	-	4	7 Novembers	0	-	7
7 Mays	-	3	-	4	7 Decembers	1	-	6
7 Junes	-	4	-	3		—		—
7 Julys	-	5	-	2		33		50

This we may, I think, fairly consider as our first contradiction to the original proposition that "The rainfall influences beri-beri or the cause of beri-beri." Of the 83 months in the list we have only 33 showing positive evidence as against 50 showing negative; some of these positive, too, show such an ill-balanced proportion that they may be fairly excluded as positive, *e.g.* :—

June, 1891, Beri-beri shows a fall of 1 admission.
       ,,   Rainfall   ,,   ,,   12 inches.
July, 1892, Beri-beri ,,   ,,   2 cases.
       ,,   Rainfall   ,,   ,,   10 inches.
June, 1895, Beri-beri ,,   ,,   13 cases.
       ,,   Rainfall   ,,   ,,   1 inch.
May, 1896, Beri-beri ,,   ,,   5 cases.
       ,,   Rainfall   ,,   ,,   8 inches.
Feb., 1897, Beri-beri ,,   ,,   23 cases.
       ,,   Rainfall   ,,   ,,   2 inches.
Oct., 1893, Beri-beri rose - 4 cases.
       ,,   Rainfall rose - 10 inches.

Deducting these cases from the positive evidence we get 27 months positive, 6 months neutral, and 50 negative; and, in fact, these 6 might almost be called negative. As an example of how I have arrived at the positive + or negative — evidence, I quote the year 1892 as a sample, 1891 having one month short :—

1892.

January, Positive	February, Negative	March, Negative	September, Negative	May, Negative
Beri-beri fell 32 to 16	fell — 16 to 13	steady 13	+ 13 to 17	+ 17 to 42
Rainfall 28 to 13	rose + 13 to 15	+ 15 to 20	± 20	± 20

And so on.

The next point of contradiction I wish to draw attention to is, that during the seven years under consideration the months in

which the greatest amount of rain fell were not the months in which the greatest number of admissions took place, nor were the months next following the heaviest rainfall the correspondingly highest in admission except in one case—namely, in the 7 Decembers, during which, taken together, 99 inches fell, followed in 6 Januaries by a total of 232 cases (232 being the 4th highest total of admissions and 99 the 4th highest of rainfall). This is a sop to the supporters of the "after rain beri-beri increase" theory, but has not very much weight when we consider that in the case of the other months (seven of each), altogether 70 months out of a possible 83, the highest rainfall does not correspond with highest beri-beri; nor is highest rain followed the next month by highest beri-beri.

The highest rain occurred in 7 Octobers, accompanied by the 7th highest number of admissions of beri-beri and followed by the 2nd highest number of admissions in 7 Novembers. The 2nd highest rain occurred in the 7 Aprils, accompanied by the 5th highest beri-beri list and followed immediately by the 3rd highest beri-beri list in the 7 Mays.

The 3rd highest (Novembers) rain accompanies the 2nd highest beri-beri and is followed by the highest beri-beri (Decembers).

The 4th maximum rain accompanies the highest and is followed by the 4th maximum beri-beri.

The 5th maximum rain accompanies the 3rd highest beri-beri and is followed by 9th beri-beri.

The 6th rainfall accompanies 11th beri-beri and followed by 7th beri-beri.

,,	7	,,	,,	9	,,	,,	10	,,
,,	8	,,	,,	6	,,	,,	5	,,
,,	9	,,	,,	12	,,	,,	11	,,
,,	10	,,	,,	10	,,	,,	12	,,
,,	11	,,	,,	8	,,	,,	6	,,
,,	12	,,	,,	4	,,	,,	8	,,

The maximum monthly rainfall for the seven years was in this order—1st Octobers, 2nd Aprils, 3rd Novembers, 4th Decembers, 5th Mays, 6th Septembers, 7th Junes, 8th Marchs, 9th Augusts, 10th Julys, 11th Februaries, 12th Januaries.

Whereas the maximum beri-beri admittances were in 1st Decembers, 2nd Novembers, 3rd Mays, 4th Januaries, 5th Aprils, 6th Marchs, 7th Octobers, 8th Februaries, 9th Junes, 10th Julys, 11th Septembers, 12th Augusts. The order of merit of the years with regard to rainfall and beri-beri shows:—

The wettest year					Beri-beri admission order		
1st	1891	inches	250	highest	1891	121	7th highest
2nd	1892	,,	178		1892	262	4th
3rd	1895	,,	123		1895	428	3rd
4th	1893	,,	111		1893	242	5th
5th	1894	,,	110		1894	204	6th
6th	1897	,,	109		1897	445	2nd
7th	1896	,,	104	lowest	1896	700	1st highest

In 1892 the district began to show signs of waking up, and mines began to be opened ; since this time the cases have steadily mounted until 1896, falling a little again in 1897.

Through the courtesy of Messrs. Grey and Thompson, of the District Office, I have had access to the district land books, and have found out the amount of land alienated by Government for mining purposes in each year, as follows : —

1891	-	None recorded	-			-	121	-	7th
1892	-	194	-	Acres	6th	-	262	-	4th
1893	-	921	-	,,	2nd	-	242	-	5th
1894	-	968	-	,,	1st	-	204	-	6th
1895	-	212	-	,,	5th	-	428	-	3rd
1896	-	840	-	,,	3rd	-	700	-	1st
1897	-	678	-	,,	4th	-	445	-	2nd

The fact that the majority of miners are Chinese, who very rarely open the ground at once, usually felling the jungle and then waiting for two years, more or less, before starting mining, coupled with the fact that everyone recognises that the district has become much busier in the last few years, will cause these figures to throw some light on the subject. Although the amount of land alienated in any given year does not bear any direct proportion to the number of cases that year, allowing the usual two years for the land to be unmined, we find from the figures of the alienation of land that 1895, 1896 and 1897 ought to have produced the highest number of cases, and actually that is so, for during the years 1893, 1894 and 1895, 2,201 acres were alienated out of a total of 3,813, and during the years 1895, 1896 and 1897, 1,573 cases of beri-beri occurred out of a total of 2,422, considerably over half the amount of total land alienated, and with over half the total number of cases in the seven years.

One more fact may be culled from the months in which the greatest amount of rain fell—viz., that they do not correspond with the highest beri-beri admissions in their individual positions, which may be seen thus : —

Cases	The maximum beri-beri	Rainfall Inches	The maximum rain
32	The maximum beri-beri for 1891 in December -	54	The maximum rain for 1891 occurred in October -
5	,, minimum ,, 1891 in Feb. & Oct.	6	,, minimum ,, 1891 March -
42	,, maximum ,, 1892 in May -	23	,, maximum ,, 1892 June -
13	,, minimum ,, 1892 in Feb. & Mar.	7	,, minimum ,, 1892 August -
35	,, maximum ,, 1893 in December -	13	,, maximum ,, 1893 October -
7	,, minimum ,, 1893 in July	3	,, minimum ,, 1893 March -
34	,, maximum ,, 1894 in April -	14	,, maximum ,, 1894 Sept. & Dec. -
5	,, minimum ,, 1894 in September -	1	,, minimum ,, 1894 February -
74	,, maximum ,, 1895 in December -	26	,, maximum ,, 1895 October -
15	,, minimum ,, 1895 in February -	1	,, minimum ,, 1895 January -
75	,, maximum ,, 1896 in November -	15	,, maximum ,, 1896 October -
36	,, minimum ,, 1896 in June	2	,, minimum ,, 1896 Jan. & May -
78	,, maximum ,, 1897 in January	20	,, maximum ,, 1897 December -
20	,, minimum ,, 1897 in July & Dec.	5	,, minimum ,, 1897 July -

It is also worthy of notice that the greatest number of admissions in any month for the several years occurred—

In 1891 in December ;   In 1895 in December ;
,, 1892 ,, May ;   ,, 1896 ,, November ;
,, 1893 ,, December ;   ,, 1897 ,, January ;
,, 1894 ,, April ;

and the highest rainfall in each year occurred—

In 1891 in October ;   In 1895 in October ;
,, 1892 ,, June ;   ,, 1896 ,,   ,,
,, 1893 ,, October ;   ,, 1897 ,, December.
,, 1894 ,, April and December ;

From this may be seen that, although four Octobers out of seven have shown the maximum rainfall, yet October does not occur in the beri-beri list of highest admittances, and the month following, that is November, only once.

These facts, coupled with the universal experience of the miners—namely, that when the mines are opened a certain large proportion of men will get beri-beri, and a comparatively small number suffer from severe malarial fevers—seem, in my opinion, to point to the cause of the disease being in the earth, or, perhaps, to its requiring the presence of malarial conditions or even parasites for its proper development.

————

Appendix III.

INOCULATION EXPERIMENTS.

The first of this series of final proofs of the identity of the micrococci as cause of the disease which this brief enquiry deals with was performed on a white pariah dog, strong, lively and healthy. After his first injection under chloroform, I regret to say, through the carelessness of an attendant, he was permitted to escape, and the only information to be gathered from this case during the two days of his confinement subsequently to the operation, is that in all probability the action of the toxin *is* cumulative, as the animal showed no signs of disease after two days, despite the fact that the micrococci as a rule develop within 48 hours in the nutrient media.

Dog No. 2, a strong, liver-coloured pariah bitch, received its first injection on 25th July, 1899; on 27th July, 1899, she seems not quite so lively as before, the pupils are very dilated, there has been

2 A

absolute absorption of the injected fluid—a 48-hour culture of tube from Case 697, 3 cc.

28th July, 1899.—$1\frac{1}{4}$ cc. of a 7-day old cult off Case 697, mixed equally with a 4-day old culture of the same case.

30th July.—Vomited this morning and refused food.

31st.—Better again to-day.

August 1st.—Well-marked tenderness of the muscles, especially hind legs.

Three cc. of a 24-hour culture of 697 injected.

August 2nd.—Tenderness marked over sciatic nerves ; stiffness in galloping and high action of hind legs in trotting; rather off her feed.

August 3rd.—Dog seems to suffer from dyspnœa on any slight exertion.

Three cc. of 3-day old cult of 697.

August 4th.—Tenderness of muscles well-marked; hind legs stiff ; dog will not gallop, and seems very averse to move about ; vomited this morning.

August 6th.—Three cc. of 48-hour culture of 697 ; no change in condition.

August 7th.—Seen by Mr. Williams, who remarked irregularity of pulse and other symptoms mentioned.

August 10th.—Four tubes inoculated with dog's blood.

August 11th.—Five days now since last injection ; dog seems to have recovered considerably during this interval, but tenderness of muscles pronounced, thinner than before, and whole body more sensitive. In one tube a growth is coming on. Three cc. of 24-hour old culture of Case 566 injected this morning.

August 12th.—Tenderness of muscles more marked ; two of the four tubes show typical white growths.

This paper being a preliminary enquiry, I feel justified in submitting it with the evidence of one animal only, as the future inoculation experiments will, I expect, extend over a considerable time, and thus cause unnecessary delay in the publication of the confirmation of Messrs. Pekelharing and Winkler's micrococci, which is the object I have set myself to accomplish as a preliminary.

The fact that the dog did not become absolutely paralytic is, I consider, a matter of her injections being interrupted in their regularity by my district duties, so that in some instances she was

allowed to go as much as five days without any ; but against the
fact of non-paralysis may be reckoned the following, which I be-
lieve entitles me to assume that she suffered and is suffering from
an attack of beri-beri, or at least of a disease which has caused
peripheral neuritis to a large extent : —

Namely—1st the extreme tenderness of the muscles ;

2nd the stiffness and stringhalt trot ;

3rd the loss to a great extent of equilibration ;

4th irregularity of pulse ;

5th Anorexia ;

6th An increase of tendon jerk, which is almost
invariably present in very early cases of the
disease ;

7th Unaccustomed lassitude ; and

8th the cultivation from her blood of a micro-
coccus having the same characters as the
micrococcus isolated from all beri-beri cases
examined.

In conclusion, I would beg that any oversights in this paper
may be overlooked, shortcomings pardoned, and in general that
excuse for a cursory epitome of hurried experiments, trusting at
the same time that the work which has been accomplished may
be of service to other workers in the almost unlimited field of
beri-beri, its concomitants and complications.

———

Dr. Percy Gerrard's paper was communicated by Dr. Alfred
R. Parsons.

Dr. A. C. O'Sullivan said that Dr. Gerrard had gone into
the subject with great care and thoroughness. He did not see,
however, why, if an attack of erysipelas would cure sarcoma,
the streptococcus would not cure beri-beri without a specific
action.

Dr. J. A. Scott said that during the epidemic of 1894 in the
Richmond Asylum, Dublin, he made, with Dr. Rambaut, some in-
vestigations into the condition of the blood in this disease. A
number of attempted cultures remained absolutely sterile. In
other cases, however, colonies grew, and these were subsequently
separated. In the memorandum he had made then he found notes

of the *Bacillus subtilis, Bacillus roseus, Penicillium glaucum*, and the like, which obviously indicated air contamination ; but there were also colonies of cocci formed which had a yellow colour when grown on any medium. Some of these suggested to him the *Sarcina lutea*, but other cultures he believed were not those of ordinary air cocci. In his notes he had the words " diplococcus " and (?) " tetrad," so that the general arrangement of these cocci occasionally suggested to him some form of tetracoccus. Some of the patients he observed were always sure finds as regards cultures, whereas other cases, equally as bad, were always sterile.

Dr. E. J. McWeeney said that the amount of material Dr. Gerrard had operated on, a loopful of blood, was so small that, if the cocci had really been in the blood, it seemed to him that there ought to have been no great difficulty in demonstrating them microscopically. There was a paucity of detail regarding the cultural characteristics of the micro-organisms found. For instance, there were no details about the temperature at which they would grow, whether they liquefy gelatine, about their growth on media containing glucose, their fermentative power, their coagulation of milk—particulars which were of importance in determining the species of a micro-organism. With regard to the improvement of the patients under anti-streptococcus serum being co-ordinated with a growth of a yellow colour obtained from the blood, he thought there could be no connection, because the streptococcus did not produce a yellow colour. The injection of the serum, however, might have produced, as Dr. O'Sullivan had hinted, a general phagocytosis of a non-specific character, but that state of affairs could not denote any connection between streptococci and beriberi. There was such an extreme difficulty in sterilising the skin that in his own work he would pay no attention to a result got from a drop of blood that had been in contact with the skin. The method he employed successfully was to extract several ccs. of blood from one of the veins in the arm with a sterilised hypodermic or antitoxin syringe. So few were the micro-organisms in even violent septicæmia that unless they extracted a good deal of blood they would not find any micro-organisms at all. It was with these precautions that he had succeeded in getting the *Diplococcus pneumoniæ* in a case of ulcerative endocarditis coming on after acute pneumonia.

Dr. Conolly Norman, referring to the micro-organisms described by Pekelharing and Winkler, said that they found them

in every patient's blood ; but they also found them in the blood of persons in Atjeh who had not beri-beri, and similar cocci were also found in the air of that place.   Dr. Norman showed illustrations of cocci found by other observers which were very dissimilar to those of Pekelharing, but he (Dr. Norman) pointed out that these cocci were obtained from the dead body, and he, therefore, considered them of little value.   Pekelharing's and Winkler's results were disputed by other investigators, amongst whom was Scheube, who said that their observations were made on dirt, and that most of the animals which they had injected experimentally had died of septic poisoning.   Glogner found parasites in the spleen resembling those of malaria, and on that fact had founded his theory, which had got a few adherents, that beri-beri was identical with malaria.   At Tuscaloosa, in the State of Alabama, cocci were found in the blood of beri-beri patients, but they were not described in detail.   One of the peculiarities of the disease which Dr. Gerrard had remarked, and which he also had noticed, was that patients frequently got relapses, and often died rather suddenly after apparently getting quite well.   In a recent monograph on the subject Grimm laid it down that beri-beri always commenced with slight initial fever.

Dr. Knott pointed out that Dr. Gerrard's cases commenced with fever and diarrhœa, and that one of his patients was engaged in mining operations.   He remembered reading some years ago the theory that beri-beri was produced by the same parasite as produced Egyptian chlorosis.

Dr. Parsons, in reply, said that most of the points which had been raised had been already touched upon by Dr. Gerrard in his paper.   Bearing in mind Dr. Scott's notes, it was interesting to observe that several of Dr. Gerrard's cover-glass preparations had shown distinctly diplococci, and in many cases tetracocci.   Most of Dr. Gerrard's patients were miners, and this seemed to point to the poison being in the earth.   In a few cases the ankylostomum duodenale was found.

FRACTURES OF THE PELVIS.

By EDWARD H. BENNETT, M.D., F.R.C.S.;

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Professor of Surgery, Trinity College, Dublin ;
President of the Royal Academy of Medicine.

THE fractures of the pelvic bones and their dislocations, which involve the brim or inlet of the true pelvis, are of great interest because of the great danger to life which they entail, and because of the difficulties which are met with in their diagnosis. Great violence is required in all but one variety to produce these lesions. The examination of the specimens with which the *post-mortem* room furnishes us, the demonstration of their complications, and the histories of injuries of extreme violence which accompany them, combine to suggest an over-grave opinion regarding them in the minds of students. Only this very day I was asked by one who watched the demonstration of two of these specimens—" Can a man ever recover from such injuries ?" I replied—" I can prove the recovery by showing pathological evidence of it, and I have in practice seen at least four recoveries." To establish this fact I present an example of completely united fractures in the gravest variety of these injuries. I have no history of the case during life, but anyone conversant with fractures will admit at once that the patient from whom it was obtained lived years at least after its occurrence. The specimen is incomplete, only half the pelvis being preserved, but it is evident that the fracture involved the pelvic brim and sacrum in the lines of the oblique diameters of the brim, just as in this complete recent specimen, of which we have the entire history, as follows :—

F. M., aged thirty-nine, while on the roof of the Dublin City Distillery, Great Brunswick-street, on the 19th May, 1898, was standing with other men on a plank which rested on the rafters and principals. They were tying the ends of two 32-feet scaffold poles. A stiff breeze was blowing from the south-east, and as an extra heavy blast came the man cried, "Hold tight, boys; that's a stiff one." In a moment the whole roof collapsed. One of the girders fell over the side of the building, bringing the men with it to the ground outside, a height of between forty and fifty feet. One of the men was killed on the spot, and was brought dead to Sir P. Dun's Hospital. The man from whom this specimen was obtained was brought to the hospital also, but alive. He had fracture of the base of his skull, of many ribs, and many minor external injuries. He did not regain consciousness, and died in three and a half hours after his admission. At the *post-mortem* examination the lower left true ribs and some of the costal cartilages were found to be broken, and the lung beneath the fractures was bruised and lacerated. The liver was bruised and showed several ruptures. The spleen was torn to the extent of an inch. There was blood extravasated beneath the pericardial covering of the pulmonary artery. Hæmorrhage had occurred into the areolar tissue around each kidney. The intestines were normal, except the descending colon and the rectum, which showed extreme subperitoneal blood extravasation. The bladder and urethra were uninjured. The diagnosis of fractured pelvis was easily made during the man's life, as abnormal movements of the pelvic bones were detected in taking the patient to bed, and crepitus was distinct between the fragments. It is clear that some part of the falling roof crushed this man's thorax, abdomen, and pelvis. There were no signs of blood from the urethra or bladder.

The next specimen I submit is of rarer character, and shows how difficulty may be present in diagnosis of fractured pelvis, even where many and great fractures exist.

J. C., aged sixty-five, fell off a ladder while working at the roof of a house in Little Ship-street on 7th April, 1898. As far as could be ascertained he fell on his left hip. He was admitted to a hospital, and died on 13th April, the death being certified to the Registrar of Deaths as having resulted from shock and hæmorrhage. On 14th April *post-mortem* examination was made by order of the coroner. There was no bruising or ecchymosis of the skin.

The heart showed slight signs of endocarditis, otherwise it was healthy. The lungs were œdematous, and the right was adherent to the chest wall. The peritoneum contained a couple of ounces of clear straw-coloured serum. The peritoneum covering the left kidney and left side of the posterior abdominal wall was dark in colour, but its surface was free of any fibrinous exudation. In the pelvis, also, the peritoneum was of a dark colour because of blood extravasated beneath it. To the hand it gave a boggy feel, in consequence of the amount of blood lying beneath it, but its surface was not covered by any inflammatory product. On exploring the brim of the pelvis in the pubic region the sharp projection of broken bone could be felt. The spinal canal was normal, no clots or excessive fluid being present. The liver was enlarged, soft, with uneven surface, but it was not injured. The spleen was pale, soft, small, and adherent to the diaphragm, but uninjured. The stomach was normal as were the intestines and the right kidney. The left kidney was surrounded by soft, dark-red blood clots, and a rupture was present on its external surface, with granulating edges. This rupture included the neck of a retention cyst. A tumour the size of a pigeon's egg was found growing into the centre of the right cerebellar hemisphere. It was firmly attached to the dura mater, over the centre of the right cerebellar fossa, and was very easily shelled out of the brain substance. Microscopically it was found to be tubercular, showing giant cells, caseation, and in places delicate connective tissue fibrils. The examination of the pelvis, prepared by careful maceration, is most interesting, for although there are many and extensive fractures none of them can be properly named complete. They are developed around the acetabulum, and were all due to great force reaching the left innominate bone through the head of the femur. The depth of the cup of the acetabulum is burst inwards and remains projecting into the pelvic cavity, fixed in its displacement by the incomplete characters of the fractures. Behind the acetabulum in the ala ilii a fissure passes up through the bone from the upper margin of the great sciatic foramen, but it terminates without reaching the crista illi. On the inner aspect of the ala, a good distance behind the line of fracture, seen externally, there exists a fracture passing through the brim of the pelvis upwards through the posterior part of the iliac fossa, but it, like the external, stops short of the crista illi. Through the left wing of the sacrum there passes a fissure which can be traced both within the pelvis and outside along the back of

the sacrum, through the line of the sacral foramina down to the lower and back part of the great sciatic notch. All these fractures exist without displacement, and are incomplete. The ramus of the pubic bone, both on the left and on the right, exhibits complete fractures, but without displacement.

In holding this specimen and compressing the several parts no abnormal motion nor crepitus can now be obtained any more than during the life of the patient after his injury; so, as the bladder and urethra were uninjured and gave no symptom during the life of the patient, it can hardly be wondered at that fractured pelvis was not even suspected.

My next specimen I have obtained very recently, since I had written the notes of those just now shown. Everyone knows that in pelvic injuries caused by extreme force the head of the femur may be thrust through the acetabulum and be dislocated into the pelvis, but specimens of the kind are very rare. The last specimen I have shown is the incomplete form of this dislocation. In this we have the complete injury and the lines of fracture similar to those seen in it, only they are all complete.

A man of about thirty-two years of age, liable to epileptic seizures, was attacked by such, and after his seizure developed signs of acute mania, as had often occurred to him before. In this condition he leaped from the window of a house where he was lodged in the care of two male attendants. His fall was into the area of the house, a height of nearly forty feet. He was brought to Sir Patrick Dun's Hospital on the police stretcher, and lived for some hours, quite unconscious. He had fracture of the base of the skull, comminuted fracture of his lower jaw, fractures of his ribs and of his pelvis. This last only am I concerned with at present. There were no indications of injury to the bladder or urethra. The right ala ilii was very freely movable, and crepitus accompanied the motions of it. As the man was moribund no detailed examination was admissible, for at almost any movement of the sites of lesion his breathing stopped. At the *post-mortem* examination the pelvic damage presented these characters—On

displacing the intestines we discovered the head of the femur on the right side projecting into the pelvis, covered only by peritoneum. On removing the membrane all the soft tissues were found lacerated behind the acetabulum ; even the obturator nerve is thrust inwards, torn from the side of the cavity ; all muscular fibres carry fragments of the broken acetabulum. The cartilage on the head of the femur is injured in one place, and the remains of the ruptured ligamentum teres are seen attached to the pit in the bone. The innominate bone and sacrum are traversed by fractures like those of the previous specimen, but differ from them in being complete fractures.

I have not as yet obtained a well-marked specimen of the double vertical fracture of the pelvis. I mention it referring to Vollemier's plate, which I have had enlarged as a diagram, only to state that three times I have met it in the living, and have had the good fortune to reduce the displacements, and in each case to have perfect recovery. Lastly, I exhibit a specimen of the fractures of the pelvis as a whole, which occur in the rickets of the aged, which take place, and to some degree unite, without the knowledge of their existence being present, nor the history of any injury. Fractures occurring in the same site as the ordinary traumatic cases in the sides of the obturator foramina, but in the ilium passing up from the top of the great sciatic notch and commonly bifurcating below the middle of the ala, but being incomplete, as the branches do not usually extend to the limits of the crista ilii.

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Mr. H. G. Croly said he had three cases to relate. The first was that of a man thrown off a dray, and the wheels of it went over the pelvis. He was found collapsed, with the symptoms of laceration of the urinary bladder. After death he found the anterior part of the bladder torn, and the os pubis fractured. The specimen is in the Museum of the College of Surgeons. The second case was that of a gentleman whose horse fell and rolled over him. On catching hold of the crest of the ilium he could

rock the ilium backwards and forwards. The patient got phlebitis of the veins of the lower extremity, but ultimately recovered. The last case occurred in a lady who fell on her coccyx. It was fractured, as could be diagnosticated by inserting a finger into the rectum. By a push backwards the bone went into its place.

PROFESSOR BENNETT, in reply, said he had put the leading varieties of these injuries before the meeting, but there were some others of which he had not examples to show. He had, of course, excluded all fractures of individual bones, the only question he discussed being that of fractures involving the pelvic brim as a whole, and he thought the specimens were complete enough to be recorded in the minutes.

SUDDEN DEATH FROM OCCLUSION OF THE PULMONARY ARTERY.

By A. C. O'SULLIVAN, M.B., F.T.C.D.;

Lecturer on Pathology, Trinity College;
Pathologist, Richmond Hospital.

A. O., aged forty-eight, was admitted, on the 4th December last, to Sir P. Dun's Hospital, suffering from a large umbilical hernia of about ten years' standing. She came under the care of Dr. Kennan, who was acting for Dr. Ball. She complained of pain in the abdomen after taking food, and of vomiting. She had no diarrhœa nor constipation. Dr. Kennan, thinking that she was not in sufficiently good condition for immediate operation, kept her in hospital until December 17th, when she died suddenly.

The Resident Pupil, Mr. Finny, who was present at her death, gives the following account of his observations :—

" The patient uttered no cry, but simply turned over on her right side, and began breathing very heavily. I saw her almost immediately afterwards. Her face was of a dull leaden hue, but not very cyanosed; her eyes were wide open, the pupils contracted; there was a small quantity of froth about the lips, which were slightly apart; the tongue was well forward in the mouth, and absolutely colourless. The respirations were slower than normal, and very stertorous; she was quite unconscious; the eyes did not move in the least when they were touched; the heart sounds were barely audible, and the pulse imperceptible. She was given injections of ether, but there was no effect. The respirations became very slow, and shortly after the patient died. The whole thing only lasted about five minutes."

At the *post-mortem* examination, which was made next morning, I found the body a very obese one. A large hernia at the umbilicus, which proved to have a multilocular sac, containing only small intestine and mesentery. The muscular wall of the part of the intestine inside the hernia was greatly hypertrophied. After examining the hernia I proceeded to remove the sternum, &c. In disarticulating the right clavicle I wounded one of the adjacent

large veins which were very distended. A large quantity of dark fluid blood flowed away. The cavities of the right side of the heart were quite empty (probably drained from the neck). On cutting up into the pulmonary artery, and passing my fingers up to the bifurcation, I found a mass situated just at the bifurcation, and projecting somewhat so as to block the entrance of the right pulmonary artery, while it extended, on filling up, the whole of the left artery. The mass proved to be a blood clot 7 inches long, $\frac{5}{8}$ inch in diameter, at one end, and tapering down to $\frac{1}{4}$ inch at the other. It was bent upon itself three times, was tough, inelastic, and dry, quite unattached to the wall of the artery, and marked in three places by the impress of venous valves. The left auricle and ventricle were completely empty. The lungs were well filled with blood. The abdominal organs were full of blood (liver, spleen, kidneys). The renal veins were full, but the vena cava below them empty. In the pelvis was a large tumour in the middle, the sides of which lay against the brim of the pelvis on each side, and pressed on the external iliac veins a short distance below their junction with the internal iliacs. The tumour proved to be the uterus, distended by a large fibro-myoma which was growing inside the cavity, and completely filled it. The tumour was movable, so that on assuming the upright position or lying on her face the pressure on the veins would be relieved. I may mention that it had produced no symptoms, as far as was known, during life. On following the femoral vein down on the right side a large thrombus was found just below Poupart's ligament. The vein on the left side was empty. The cerebral meninges were somewhat injected, but the brain substance was very pale in colour, and showed no red points on section.

The explanation of these appearances seems to be that a thrombus formed, owing to the pressure of the tumour, probably in the long saphena vein on the left side. The upper end of the clot projected into the femoral vein, and the whole thing was sucked up by the current of blood in that vein, and finally reached the heart, where it was bent up in the manner described, and then driven into the pulmonary artery. Here the sudden blocking up of the vessel caused an equally sudden fall in the aortic blood pressure, and death resulted from stoppage of the cerebral circulation.

PROFESSOR BENNETT said he had seen this case, and he confirmed the observations on the appearance of the patient.

MR. H. G. CROLY thought that if intra-pelvic tumours, which were so common, could produce this effect of sending a clot up to the pulmonary artery, it was a remarkable thing that death was not more common from this cause in such cases.

PROFESSOR E. J. MCWEENEY inquired as to the condition of the portion of lung supplied by the occluded branch of the pulmonary artery. Was it infarcted with blood or obviously anæmic, or in what condition was it? As far as his reading went he believed the enormous length of the embolus to be unique.

PROFESSOR O'SULLIVAN, replying, said that, as he had mentioned, the condition of the lungs was that they had rather more blood in them than usual. It was the entire pulmonary artery that was blocked, as the clot went into the left branch, and blocked the right by projecting into the main trunk across the opening. He had omitted to mention that there was great œdema of the legs, and the superficial veins were tortuous and varicose.

NOTE ON THE EFFECT OF CERTAIN VARIATIONS OF THE NUTRIENT MEDIUM ON THE GROWTH OF THE TYPHOID BACILLUS.

By E. J. McWEENEY, M.D.;

Pathologist to the Mater Misericordiæ Hospital;
Professor of Pathology and Bacteriology, Catholic University Medical School.

PROFESSOR E. J. McWEENEY, stated that the results of a series of experimental cultures made by him, and exhibited at last meeting, went to show that (a) the growth improved with increasing addition of $\frac{N}{10}$NaOH to the unneutralised gelatine up to the beginning of alkalinity (indicator phenolphthalein); (b) the addition of salt in quantities varying from 0·1 to 1 per cent. to the fully-neutralised gelatine (same indicator) made no difference in the amount of growth; (c) the omission of both salt and peptone exercised no appreciably unfavourable influence on the growth in gelatine made with meat decoction; (d) addition of quantities of phenol to gelatine in the proportion ·05 to ·5 per cent. exercised an inhibitory influence on all growths when the addition exceeded ·07 per cent.; between ·05 and ·07 the effect was to check the anærobic growth; and (e) Parietti's solution added to ordinary bouillon suppressed the growth of typhoid when coli was also present. The addition of 9 drops (0·3 c.c.) to 10 c.c. bouillon, to which was subsequently added a few drops of a mixture containing both typhoid and coli (*e.g.*, bile from a patient dead of typhoid), caused such retardation of the growths produced by plating

out the tube on gelatine as to make them closely resemble true typhoid colonies. Tests, however, proved that nothing but coli grew in the Parietti tube, although ordinary agar plates from the same material yielded an abundance of typhoid colonies. It was on the suppression of typhoid by the Parietti test that the speaker desired to lay especial stress.

HISTOLOGY OF TUBERCULOSIS OF INTESTINES AND LIVER.

By E. J. McWEENEY, M.D.;

Pathologist to the Mater Misericordiæ Hospital;
Professor of Pathology and Bacteriology, Catholic University
Medical School.

[Read in the Section of Pathology, February 23, 1900.]

PROFESSOR E. J. McWEENEY showed some naked-eye and microscopical preparations of this condition taken from a patient in Dr. Dempsey's ward at the Mater Misericordiæ Hospital, who had died of diarrhœa due to tuberculous enteritis. The floor of the very extensive ulcers was composed of granulation tissue consisting of cells with simple and polymorphous nuclei, but seemingly devoid of giant cells. Enormous multitudes of tubercle bacilli were lying between these cells, and were often actually in contact with, but not within, them; yet the tissue *showed practically no sign of caseation*—a remarkable fact in view of the extensive areas of caseation met with so commonly in tuberculous lymphatic glands, where even the most careful examination fails to reveal a single bacillus. The toxin that produces caseation might conceivably be contained within the bacillary bodies, and only becomes free by their breakdown. This, at any rate, would be an explanation of the frequent want of association between demonstrable bacilli and extensive caseation. The liver sections constituted a classic object for the study of the histogenesis of tubercle, showing as they did tubercles in the very earliest stage of development, when they consisted of only a few epithelioid and lymphoid nuclei. As the result of a very careful examination of a number of sections, exhibitor had arrived at the

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conclusion that many of the tubercles began by proliferation of the nuclei of intra-lobular capillary endothelium. The products of such proliferation were the " epithelioid " cells, with which a certain number of uninucleated "lymphoid" elements were *ab initio* associated. A certain amount of fibrin was present from the very commencement, and formed a reticulum between the cells of the young tubercle. The first effect on the surrounding liver cells was compression and flattening. As the result of careful study he had arrived at the conclusion that the hepatic cells immediately adjoining the tubercle underwent metaplasia, and became converted into " epithelioid " elements. Giant cells began to make their appearance when the tubercle attained a diameter of 0·2 mm.; between 0·1 and 0·2 mm. giant cells were absent. They were at first no bigger than an epithelioid cell, but were characterised by a more distinct margin and a plurality of nuclei, which were the closer packed the younger the giant cell. He had convinced himself that, in this case at least, the multiplication of nuclei took place either by direct division or by a sort of sprouting. He had failed to observe mitoses in young giant cells.

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Dr. A. C. O'SULLIVAN said if he understood the first experiment on the typhoid bacillus rightly, it was really decrease of acidity that was being estimated. It would be interesting to know if a further condition of alkalinity would make the growth go off, or possibly make a stronger growth. The observation that phenol acted first on the anaerobic growths might be explained by the fact that typhoid bacilli are what are called facultative anaerobes—that is, their natural mode of growth is aerobic, and their anaerobic growth is, therefore, strained, and the inhibitory drug acts first on the restrained kind of growth. He could corroborate Dr. McWeeney's results as regards Parietti's solution, as he had frequently observed that *B. coli* will grow in

Parietti's broth in stronger solutions than typhoid—that is to say, if they had two sets of tubes side by side, the typhoid tube would remain clear, while the *B. coli* tube of the same strength would produce a growth. The method of Parietti was very useful for the analysis of water, but was entirely useless for analysing milk for the typhoid bacillus, because there were so many organisms in milk standing a mixture of hydrochloric acid and carbolic acid better than the typhoid bacillus. Speaking of the tubercular lesions examined, he said the case in which he found more tubercle bacilli than in other cases was a case of very acute pulmonary tuberculosis, a rather rare form, in which the lung was invaded by an exudation, mainly serous, and on inspection the lung did not appear as if tuberculous at all. The case occurred in a child, and death was very rapid. There were no tubercles, no giant cells, no caseation, but the amount of tubercle bacilli found in the alveoli was enormous, so that in that case a rapid course seemed to have been produced by a large number of bacilli.

Dr. E. J. McWeeney, in reply, said he agreed with the statement that Parietti's solution was of no use for the analysis of milk. On plating out with gelatine they got a number of things which they could not say definitely to be true *B. coli* or pseudo-coli. He acknowledged the justice of the correction with regard to the reaction—he should have said decrease of acidity.

DERMOID PATCH ON CORNEA.

By A. H. BENSON, F.R.C.S.;
Ophthalmic Surgeon to the Royal City of Dublin Hospital;
Surgeon, St. Mark's Ophthalmic Hospital;
Examiner in Ophthalmology, Royal College of Surgeons.

CORNEAL dermoid tumours, or dermoid patches as they might often more properly be called, are amongst the very rare congenital abnormalities. They are most usually situated astride the sclero-corneal margin at its inferior temporal segment; but in my case the patch was situated at the inferior nasal side, and was almost entirely corneal.

These tumours are usually single, but Haynes Walton figures a case where two corneal dermoids existed in the same eye.

They vary very much in size, depth, and prominence, sometimes sitting lightly on the cornea, and rising globularly from its surface; at other times, as in my case, occupying the whole thickness of the cornea.

Some ascribe their occurrence to an arrest of development, and they are often associated with other congenital anomalies. Remak considers that like the dermoid cysts of the orbit, these corneal dermoids are due to a fœtal invagination of the external germinal layer; whilst von Duyse considers that they more probably owe their origin to a circumscribed adhesion between the amnion and the surface of the eyeball; the adhesion subsequently is drawn out into the form of a cord, and at length breaks quite in two, its point of attachment to the eye remaining behind as the dermoid patch or tumour.

Dermoids of the cornea are solid, not cystic, and are essentially benign. They might, therefore, often be left

alone but for the disfigurement which they cause. If they tend to increase in size, or if they cause irritation, either from their size or from the hairs which often grow from their surface, their removal becomes imperative.

As they are, in fact, islands of true skin on the cornea, so they contain most of the same structures and appendages as true skin, including sebaceous glands, hairs, &c., and the large number of fat cells sometimes found may even suggest a lipoma. The hairs on the surface of the patch are usually fine, colourless ones, as in this case, but at times they grow large and strong, and are a source of much irritation.

Wardrop, in 1808, described a case of this kind, under the name of " A fleshy excrescence of the cornea." " The patient," he says, " was upwards of fifty years old, and the tumour had been observed from birth. It was about the bulk of a horse bean, and only a small portion of it adhered, and seemed to grow from the cornea ; the other part was situated on the white of the eye, next the temporal angle of the orbit. Its surface . . . . . was smooth like a pterygium, and seemed to be covered by the conjunctiva, having the natural colour of that membrane. But the singularity of this case was, that a considerable number of very large and strong hairs, upwards of 12 in number, grew from the middle part of it, passed through between the eyelids, and hung over the cheek. The patient remarked that these hairs did not appear until he advanced to his sixteenth year, at which time also his beard grew."

Members have already had an opportunity of examining the sections kindly made for me by Dr. Earl.

CASE.—A child, aged four months, was brought to me in consequence of a prominent whitish mark on the left eye, which was congenital.

The baby was otherwise a fine, well-nourished, proper child, without maim or defect. The parents attributed the condition to a fright experienced by the mother during pregnancy.

On examination I found an almost circular patch of creamy white colour, raised above the surface of the surrounding tissues, covering the cornea almost to its apex, and extending over the sclero-corneal junction for about 2 mm. at the inferior nasal side.

The surface was slightly rough, and entirely wanting in gloss, and was raised about $1\frac{1}{2}$ mm. above the level of the cornea, with a very definite line of demarcation between.

No blood-vessels of any size were visible on the growth, which gave one the idea of a drop of clotted cream which had fallen on the eye, and had slightly dried and become wrinkled on the surface.

The eyelids could easily close over the globe, but the prominence of the patch was very visible when the eyelids were closed, and when open the lower lid was pushed away from direct contact with the globe, and the eye had, in consequence, a watery look, and the tears collected, and at times overflowed. The parents thought the patch was growing, and felt sure it was larger than at birth.

Beyond the teary, watery look of the eye, the child seemed to feel no inconvenience from it, and there was no tenderness of any sort. The pupil acted freely, and the anterior chamber was of normal size.

The tumour had to be dissected OUT OF, rather than OFF, the cornea, for I found that it occupied the whole thickness of the cornea, right down to the posterior elastic lamina, which was apparently clear.

The specimen was placed in formalin solution and given to Dr. Earl, who kindly cut sections of it and has reported as follows:—

"The tumour consists of—(1) an epidermis, showing a stratum spinosum, a stratum granulosum, and a stratum corneum, the latter being very thin; the epidermis merges into the corneal epithelium, near the edge of the tumour. (2) A dermis of very dense connective tissue, with very short, broad papillæ. (3) A layer of adipose tissue beneath this. Most sections contain hairs and badly-developed sebaceous glands; in some there are sweat glands; there is no corneal tissue present."

Dr. WALTON BROWN (Belfast) asked what sort of tissue was the result of healing. He remembered a similar case about four

months ago, in which the wound filled up with granulation tissue, which he had great trouble in treating, the only thing keeping the tissue in subjection being nitrate of silver. He inquired how long it took the patient to get well, as in his case it took about three months.

Mr. Benson, in reply, said he had not referred to the treatment and mode of healing of the case on account of this being a pathological section. It took, however, about two weeks to heal up, which it did without any undue irritation, and the resulting cicatrix was a perfectly smooth leucoma such as they would have after an ulcer. It was not cockled in the least, nor was there the slightest sign of granulation tissue, and he could only assign this result to the use of xeroform. It had been two or three months done, and there was not the slightest sign of bulging of the cicatrix, which he thought would have been likely to have occurred.

DISLOCATION BETWEEN LAST CERVICAL AND FIRST DORSAL VERTEBRÆ (FORWARDS), WITH CRUSHING OF THE CORD AND ITS MEMBRANES; DEATH OF PATIENT IN 20 HOURS, AND PRODUCTION OF THE SPECIMEN OBTAINED AT THE INQUEST.

By R. BOLTON M'CAUSLAND, B.A., Sen. Mod.,
M.D. (Univ. Dub.);
Councillor and Fellow, Royal College of Surgeons;
Surgeon to Steeven's Hospital, Dublin.

[Read in the Section of Pathology, March 23, 1900.]

DISLOCATION of the spine in the cervical region, with the fact of the patient living for about 20 hours after the occurrence of such a terrible injury, along with the absence of other injuries, coupled with some interesting signs and symptoms, and the production of the specimen, will, I hope, prove an excuse for reading the short notes of the case that I wish to bring to your notice :—

CASE.—J. E., aged fifty, a labourer, was working for a clergyman near Dublin, cutting a branch off a tree, and was standing on a ladder. This gave way, and he fell to the ground, about 14 feet, pitching heavily on to the back between the shoulders. He was brought to Steeven's Hospital, and admitted under my care on February 12th, 1900. When I saw him he was sitting up in bed, with a bedrest behind him ; the head seemed bent forwards, and the respirations were of an asthmatic type—*i.e.*, short inspiration and prolonged expiration. Our House Surgeon, Dr. Dobbin, told me the upright position was the one most comfortable to the patient, and that he got breathless and cyanotic on being laid down. The patient told me, speaking plainly, but slowly, and with difficulty and some hesitation, that he was in previous good health, but had suffered from bronchial attacks, and asthma as well, and was able to walk

well, but that after the fall he could not walk, and had no feeling when he came to.

On examination I found complete paralysis of the lower limbs, and loss of sensation and reflexes (superficial and deep), the abdomen distended and tympanitic, and the breathing diaphragmatic. There was drop-wrist on both sides, forearms were flexed and semi-pronated, anæsthesia on front and back of outer side of elbow and forearm, radial and dorsal side of wrist and hand and outer three and a half fingers, showing complete paralysis of the musculo-spiral nerves. There was no girdle pain, though the trunk-paralysis came high up on the body, and I could not find any line of hyper-æsthesia nor paræsthesia. There had been no priapism nor emission of semen, no discharge of urine nor fæces, the bladder was empty, but the urine had been drawn off, sp. gr. 1022, acid, deposited much lithates, some albumen, and a trace of phosphates. The pupils were contracted, but sight, hearing, smell, taste, protrusion of the tongue, all seemed normal, and swallowing of fluids and soft bread caused no trouble. I carefully examined the pharynx, but there was no protrusion visible or to be felt by the finger. Rotating and bending the head gave neither trouble nor pain.

With plenty of help I cautiously laid the patient down on his side, and rapidly examined the back and vertebral spines. There was no median swelling, depression, or irregularity, or special pain or crepitus over any of the spines, and all tenderness was confined entirely to the prominent parts of the scapulæ. These were sore to the touch, and evidently bruised, and the soft parts were swollen. Owing to intense difficulty of breathing we had to raise the patient, and this condition quickly improved again. It was easy to recognise the serious nature of the injury, and to diagnosticate the position of it, but I must say that, in the absence of any direct local evidence of dislocation or fracture, I was more inclined to a local injury of the cord caused by laceration or hæmorrhage, and the upright position, most easy to the patient, seemed to favour such a view. I ordered an icebag to the spine, easily digested, nourishing diet, the bladder to be attended to, an air-cushion under the buttocks (if it gave ease), and ergot and belladonna internally. I also asked Dr. Dobbin to summon my colleagues, including the President of the Academy, for that day, or for the following day should the patient live, with a view to operative methods or treatment to relieve the existing pressure on the cord.

Unfortunately, about three hours after I saw the man he died quite suddenly while taking a drink of milk. Dr. Dobbin made the *post-mortem* at the subsequent inquest, and kindly obtained the specimen for me. He tells me that even on the *post-mortem* table no irregularity of the spine could be felt or seen, but on removing the overlying parts a dislocation forwards of the cervical vertebræ was at once brought to view, with laceration of the cord and its membranes. Any attempts at reduction, or even operation, would have been useless.

ON RUPTURE OF THE APPARENTLY HEALTHY ŒSOPHAGUS.

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[Read in the Section of Pathology, May 4, 1900.]

CASES of the above occurrence are rare—so rare that having lately observed one I have thought it well to collect the others which have been recorded and endeavour to present as accurate a picture as possible of this hitherto invariably fatal accident. The occurrence seems worthy of attention, not only on account of the interest attaching to its rarity and the peculiar and alarming symptoms with which it is attended, but also because the cases resemble each other so closely in previous history, signs, and symptoms that a correct diagnosis is quite within the bounds of possibility, and modern advances in the surgery of the mediastinum seem to warrant a hope in the feasibility of successful intervention in some future case. I shall first detail particulars of a case under my own observation :—

A man, aged forty years (Case 17 in the table), was admitted to the Mater Misericordiæ Hospital at 1 p.m. on Nov. 18th, 1899, complaining of pain, not very intense, in the lower part of the chest and of swelling of the neck. His face was deeply cyanosed, he seemed to be gasping for breath, the pulse was quick and weak, and his general condition was somewhat collapsed. The neck and face were much swollen on both sides, and palpation at once revealed the fact that the swelling was due to subcutaneous emphysema. His voice was low and hoarse, and he spoke little, and that with much difficulty. No treatment had any effect, and the dyspnœa became more intense, the pulse weaker, and the emphysema meanwhile crept up to the eyelids and down the thorax. Death occurred

at 8 p.m.   His friends stated that he was of alcoholic habits, and
that he "had been more or less drunk every night for the last 20
years."   He used to vomit every morning, and was much given to
"dry retching."   On the evening before his death he had had
tinned salmon for dinner, and the following morning had retched
worse than usual.   Nevertheless he went to his work, and whilst
there noticed that his neck was swollen so that his collar became
uncomfortably tight.   His breathing became difficult, and he felt a
good deal of pain in the lower part of the chest.   The exact period
of onset of the symptoms could not, however, be certainly deter-
mined.   At about noon he left his work and went home, whence
his friends took him to the hospital.

Necropsy.—At the necropsy, which was performed by me 40
hours after death, the body was found to be that of a muscular
middle-aged man.   Post-mortem lividity was extensive, and the
features were almost obliterated from emphysema, which extended
from the eyelids to the mammary level.   A brownish frothy fluid
flowed from the mouth and nose.   Post-mortem rigidity was well
marked in the legs and elbow-joints, but was absent from the shoul-
ders.   On removing the sternum the cellular tissue of the anterior
mediastinum was seen to be emphysematous.   The left pleural
cavity was partly obliterated by adhesions in front, and behind it
was filled with brown pultaceous fluid, in which were bubbles of
gas.   The left lung was collapsed so far as the adherent pleura
would allow, and was almost solid with œdema.   On removing the
lung and sponging out the pleural cavity a slit-like aperture was
seen at its lower and back part leading into the œsophagus.   The
right pleural cavity, almost obliterated by adhesions, contained a
little brownish fluid, whilst the lung was covered behind with a
layer of discoloured fibrinous exudate which felt greasy.   It was
intensely œdematous and almost airless.   The pericardium con-
tained four ounces of pink serum, in which gas-bubbles appeared
when the heart was raised up.   These were seen detaching them-
selves from the point of entrance of the pulmonary vessels into the
pericardium.   The size and weight of the heart were normal, but
it was very flabby; there were atheroma of the commencement of
the aorta, and some fatty degeneration of the left ventricle was
noticed.   On removal of the heart and the lungs the whole contents
of the mediastinum from the root of the neck to the diaphragm
were seen coated with brown pultaceous material mingled with
bubbles of gas.   The matter was seen issuing from a slit-like aper-

ture nearly 1·5 centrimetres long in the anterior surface of the œsophagus immediately above the diaphragm. The opening was quite clean cut, with sharp edges, from which a few small blood-clots projected—evidently thrombosed veins. The opening extended down quite to the level of the diaphragm, and from its lower end a linear tear in the mucous membrane ran some distance into the cardia. There was no trace of ulceration, and the wall of the gullet was fully as thick as normal. The wall of the gullet on each side of the rupture felt somewhat softened, but there was no discoloura-tion of the mucous membrane. The mucosa of the stomach was, however, distinctly discoloured — blackened — with hæmorrhagic erosions at the cardiac end, and was streaked with dark lines cor-responding to the veins. It was decidedly softer than normal, but could not be said to have been digested. It contained a good deal of brownish fluid identical with that found in the pleural cavities and mediastinum. The abdominal organs seemed healthy, except the liver, which was enlarged and fatty, but, contrary to expecta-tion, not in the least cirrhotic. The omentum was much infiltrated with fat, and the pelvis contained a few ounces of serum.

Morbid Histology.—The specimen was dissected out and placed in 20 per cent. solution of formalin. The removal from the side of the rent of pieces of tissue comprising the entire thickness of the gullet wall could, of course, not be practised without materially in-juring the macroscopic appearance of the specimen. This draw-back was, however, the more readily put up with, because, so far as could be ascertained, no detailed microscopic examination of such a case had ever been published. Three pieces of tissue were there-fore removed from different levels at one side of the laceration, comprising the edge of the actual rent and embedded in paraffin, whilst a much larger piece, comprising a nearly complete transverse slice of the œsophagus, was taken from a point below the lower end of the rupture, so as to include the above-mentioned tear in the mucous membrane, and imbedded in celloidin. This gave the bests results as the formalin fixation proved a little too "light" for the best class of paraffin work. 1. The *epithelium* at the level of the rupture was well preserved except on the top of the folds that projected into the lumen. In the crypt-like spaces between the folds it was particularly well preserved, and the prickle-junctions of the cells were quite distinct; about 0·1 millimetre from the edge of the rupture it ceased quite suddenly. The tear above mentioned as prolonging the rupture proper down into the stomach was found

to be in reality a deep groove between two projecting folds of mucous membrane. The sides of this fold were partly stripped of epithelium, and its floor was broken through so as to lead into a minute cavity in the sub-mucosa crammed with leucocytes and containing clusters of cocci. On the surface of the epithelium there were but few micro-organisms. 2. The *sub-epithelial tissue* near the rupture and below it was much damaged, and had to some extent lost its staining power. It consisted for the most part of unstriped muscle in a markedly dissociated state, with a few compound race-mose glands, and numerous veins, which were strikingly large and for the most part collapsed and empty. Here and there, however, one was seen to contain an organised thrombus containing round mononuclear elements and fibroblasts. There was also diffuse leucocytic infiltration. 3. The muscular coats, longitudinal and circular, were quite thick and well developed. The individual bundles were somewhat loosely compacted, as though they had undergone partial dissociation. Towards the edge of the rupture their outlines became less distinct and faded away amidst masses of multifarious micro-organisms. In both the muscular layers were sinuous tracks crammed with polynuclear elements, amongst which spherical and elongated masses of cocci were readily demonstrated in preparations stained by Gram's method (Czaplewski's modifi-cation), after previous treatment with lithiocarmine and differentia-tion in acidulated alcohol. In the bundles of circular muscle which were, of course, divided longitudinally on the transverse sec-tion of the gullet, patches free from nuclei, and presenting a hyaline-degenerate appearance, were here and there detected. 4. The outer fibrous coat contained adipose tissue in small amount, whilst a few nerve-fibres and an occasional ganglionic cell were seen. Its outer surface where it had been in contact with the extravasated gastric contents was quite necrotic and swarmed with various bacterial forms. The nuclei had lost their staining-power. The inner part adjacent to the longitudinal muscle coat was in a state of intense leucocytic infiltration, and contained numerous colonies of cocci. Other forms of bacteria were not seen. Here were also many large veins, most of them quite solidly thrombosed, the process being of recent date, as was evidenced by the outline of the red discs being still visible. Organisation was, however, in progress, as was evi-denced by the presence of mononuclear elements and fibroblasts. Immediately outside these veins were numerous polynuclear leuco-cytes and cocci. The general impression produced by a study of

these sections was that whilst the outside of the gullet and the sides of the rupture were gangrenous and swarmed with the multifarious organisms derived from the gastric contents with which they had been in contact, the deeper parts of the gullet wall were in a state of purulent inflammation owing to their invasion by pus-cocci. There was also a thrombo-phlebitis of the œsophageal veins which, however, could not have been septic in the first instance. Had it been so, organisation would hardly have occurred. I cannot look upon either the thrombo-phlebitis or the purulent infiltration as having developed during the few hours that elapsed between the occurrence of rupture and the termination of life. The loss of epithelium and of staining-power and the dissociation of the sub-mucous structures may be interpreted as evidence of a process of intra-vital digestion. Considering, however, the fact that 40 hours elapsed before the necropsy was made, it would not perhaps be justifiable to attribute these changes to other than *post-mortem* alteration.

PREVIOUS RECORDS.

In searching the records it is important to exclude cases in which the œsophagus has been perforated—(a) from within by foreign bodies, such as bones, false teeth, &c., or by bougies, probangs, and the like introduced for diagnostic or therapeutic purposes, or by ulceration,[a] malignant or otherwise ; and (b) from without, by the erosion of aneurysms, adherent masses of caseous glands, tumours, and the like. The possibility of the occurrence of *post-mortem* digestion and of agonal œsophago-malacia has also to be borne in mind, and the appearances so produced carefully distinguished from the results of sudden rupture taking place *intra vitam*. Failure to appreciate this distinction is responsible for several erroneous records.[b] Eliminating these faulty observations, there remain seventeen indubit-

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[a] In excluding cases of ulcer it is important to remember that the mere solution of continuity due to rupture is liable to be described as an " ulcer." Compare the case of Lindemann and that of Lindsay and Lorrain-Smith.

[b] Kade : De Morbis Ventriculi. Halæ. 1798, p. 16. Guersent : Bulletin de la Faculté de Médicine de Paris. 1812. Tome I., p. 73. Bouillaud : Archives Générales de Médicine. 1823. Tome I., p. 531.

able and more or less carefully observed cases of rupture of an apparently healthy gullet. In the appended table I have endeavoured to bring out the salient features of these seventeen cases, so far as I have been able to collate them.

The first of these observations, and in some respects the most interesting, was made by the illustrious Boerhaave, who published a full account of it in Latin. His patient was the celebrated Dutch Admiral Baron Wassenaer, and the following is an abstract of Boerhaave's description, which from its fulness and scientific minuteness may well be looked upon as classical. (Case 1 in table.) The baron, a man about fifty years of age, moved in the best society of Holland, and was a diner-out and a large eater, though not a heavy drinker. After meals he used to feel a disagreeable sensation in the cardiac region of the stomach and obtained relief by the use of emetics. On the day of his attack, being in the best of health, the baron partook at his early dinner of the following substantial repast:— Veal soup with herbs, boiled lamb with cabbage, fried sweetbread and spinach, a duck, two larks, and a compôte of apples. For dessert he had pears and grapes, followed by sweetmeats. His beverages were beer and moselle. Afterwards he went out riding, and on his return, feeling uncomfortable in the epigastrium, he took three cups of hot *thistle tea* to induce vomiting; but with poor success. He then drank four cups more of the same decoction, and whilst straining violently in his efforts to vomit he was suddenly seized with a terrible pain and shrieked aloud, so that his servants rushed to his assistance. He exclaimed that something had given way in his stomach and that he felt sure he must die at once. In a cold perspiration and ghastly pale he was taken to bed, and the nearest medical man was sent for who resorted to friction with warm cloths, administration of mucilaginous drinks, olive oil, and poultices.

There was no more vomiting, and everything taken was retained. Boerhaave, who then came on the scene, found the patient complaining only of an intense pain in the epigastrium, much increased by eructation and by movements of the spinal column. He was sitting up in bed with his body bent forward, almost doubled in two. There was no nausea, no difficulty in swallowing, no hiccough, and no abdominal tenderness. The patient's mind was quite clear, and he assured Boerhaave that some change must have taken place in the position of parts within the chest. Diagnosis was impossible, and the measures resorted to— hot fomentations, venesection, &c.—were unavailing to give the slightest relief. Very little urine was passed despite the large amounts of fluids swallowed. After a night of the most intense agony, dyspnœa began to come on ; the pulse began to fail about three o'clock in the following afternoon, and death supervened at five o'clock. Twenty-four hours afterwards Boerhaave made the necropsy. He found extensive subcutaneous emphysema, the heart normal, and both lungs collapsed. The pleural cavities contained 104 ounces of fluid, consisting for the most part of what had been taken by the patient during the last hours of life. The material smelt of roast duck. On the pleura covering the œsophagus was a flabby blackish spot about three inches in diameter, in the centre of which was a rent one and a half inches long by about a third of an inch wide, from which fluid similar to that in the pleural cavities could be squeezed, and which communicated with the lumen of the gullet. This was found to have been ruptured, and the two ends retracted in opposite directions. The most careful examination failed to reveal the existence of any ulcerative or other morbid process in the coats of the gullet, which appeared quite healthy. The stomach and intestines were distended with gas, but otherwise normal.

This case recorded by Boerhaave is unique in presenting a complete transverse division of the gullet. Its rapid course and severe symptoms are in harmony with what is usually observed. Fitz's case (Case 8 in the table), on the other hand, lasted no less than seven and a half days, and as the observation has been very carefully and fully recorded by its author, who was at that time Assistant Professor of Pathology at Harvard, it may properly be abstracted in this place. The patient, a merchant, aged thirty-one years, was in a debilitated condition from over-indulgence in alcohol, and suffered from gastritis and hæmatemesis. For years he was in the habit of cutting his food into small pieces, and he ate slowly, but never complained of pain or difficulty in swallowing. Whilst at supper a morsel of food lodged in his gullet, and it was only after an hour of great discomfort that he succeeded in ejecting the substance, which proved to be a piece of gristly meat nearly circular in shape, about an inch in length and rather more than half an inch in diameter. It came from his mouth with noise and force as if propelled from a popgun; he sank back exhausted and ejected a moderate quantity of clotted and liquid blood. A swelling was then noticed at the angle of the lower jaw on each side (emphysema). In the subsequent progress of the case but little pain was complained of till the sixth day, when it became sharp and excruciating, and was accompanied by tonic spasms of the flexor muscles of the limbs. Swallowing and vomiting could both be quite well performed. Respiration was likewise not interfered with until the last day of life. Emphysema was extremely pronounced; the whole subcutaneous tissue of the body appeared to be undergoing a process of inflation. The face, the eyelids, the upper part of the chest in front, and the entire back were swollen; the scrotum was enormously distended, and the inflation extended to the middle

of the thighs. At the necropsy Dr. Fitz found the anterior
mediastinum to be emphysematous, independently of the
conditions produced on removal of the sternum. The left
pleural cavity was obliterated by old adhesions, which were
emphysematous, and the costal pleura contained numerous
bullæ distended with air. The lungs were œdematous and
the lower lobes were moderately collapsed. In front and
to the right, at and below the bifurcation of the trachea
was found a longitudinal rupture of the œsophagus, two
inches in length, extending through all its coats. Its edges
were sharply defined and gave no evidence, microscopically
or otherwise, of a pre-existing ulcerative or degenerative
process. A communication was thus established between
the œsophagus and mediastinum in all directions and behind
the former to a limited extent. This cavity was of the
volume of a small lemon, was crossed by fibrous trabeculæ,
and was filled with clotted blood. Its walls, neither soft
nor pulpy, were of greenish hue, and the thickened and
reddened left pneumogastric nerve could be seen projecting
behind. The tissues of the posterior mediastinum on the
left side were spongy and stained with blood. The
pleura covering the cavity mentioned on the right side was
adherent to the opposed upper lobe of the lung, the
adhesions being recent, discoloured, and offensive. The
inner surface of the œsophagus, from the bifurcation of the
trachea to the cardiac orifice of the stomach, was of a
greenish colour. Its epithelium was slightly flocculent,
occasionally thickened in patches, and was entirely absent
over a space an inch in diameter below the rent, the exposed
surface being smooth and shining; its walls were of normal
consistence. The appearances presented by the stomach
were those of chronic gastritis, and there was no indication
of *post-mortem* softening.

TABLE of 17 Cases of Rupture of the Apparently Healthy Œsophagus.

No. of case	Sex and age	Alcoholic	Previous history	Onset	Symptoms	Emphysema	Duration of life in hours	Shape and position of rupture	Results as determined by necropsy	Authority and date
1	Male, over 50.	?	Gouty; heavy eater; accustomed to use emetics.	Sudden; whilst retching.	Felt something give way; intense pain; collapse; typical situs; dyspnœa.	Yes.	18	Complete transverse rent three fingers' breadth above the diaphragm.	Collapse of the lungs; air and gastric contents (104 oz.) in both pleural cavities.	Boerhaave,[1] 1724.
2	Male, ? age.	Yes.	"Debauch" the previous night.	Sudden, after drinking hot water to induce vomiting.	Felt something give way; slight hæmatemesis; severe pain; dyspnœa; collapse.	"	About 12	Longitudinal slit just above the diaphragm big enough to admit two fingers.	Double pneumothorax; gastric contents in both pleural cavities.	Dryden,[2] 1787.
3	Male, 24.	"	Severe epigastric pain and vomiting for several months.	Sudden, after public dinner, during vomiting.	Slight vomiting; severe epigastric pain; typical situs.	"	14	Large rent just above the diaphragm.	"Portions of food in the lower part of the chest."	Wilkinson King,[3] 1843.
4	Male, 38.	"	"Took lye when a child and since then food has stuck near pit of stomach.	Sudden, after attempting to swallow a sausage which became impacted and caused straining.	After striving to vomit, some hæmatemesis; pain; oppression; dyspnœa; typical situs.	"	50	Gaping rent one and a quarter inches long by three-eighths of an inch wide three inches above the cardia; edges sharply defined.	Gangrenous cavity in the posterior mediastinum; "exudation" in both pleural cavities.	Meyer,[4] 1858.

5	Male, 35.	Yes.	Gastric disturbances six weeks previously, when a bone was thought to have been swallowed.	Sudden, after carouse.	Vomiting at first, then pain; dyspnœa; collapse; typical situs.	Yes.	11½	Longitudinal tear five centimetres long, encroaching on the stomach.	Double pneumothorax; six to eight ounces of reddish fluid containing solids and fat in each pleural cavity; gangrenous cavity in the mediastinum.	Gramatzki,[5] 1867.
6	Male, 49.	? Pro-bably	—	Sudden, after meal of ducks, green peas, and plum pudding.	Felt something give way during vomiting; pain; dyspnœa; collapse; died asphyxiated.	,,	16	Longitudinal slit one inch long just above the dia-phragm.	Three quarts of fluid containing food in the left pleural cavity; lung collapsed.	Griffin,[6] 1869.
7	Male, 35.	Yes	Drinking hard for several days before onset; from infancy had some dysphagia.	Sudden, after vomiting and whilst exercising a horse.	Felt something give way; pain; dyspnœa; intense thirst; collapse.	Not stated.	7½	Slit one and a half inches long in the left side of the lowest part of the gullet, extending further in the mucous than in the other coats; edges well defined above; irregular and softened below.	Gangrenous cavity in the posterior medi-astinal opening into the left pleural cavity, which contained two quarts of fluid containing starch and oil; lung collapsed.	Charles,[7] 1870.
8	Male, 31.	,,	Repeated at-tacks of gas-tritis; delirium tremens; hae-matemesis.	Sudden, during violent efforts to dislodge a piece of meat impacted in œsophagus.	Pain and dys-pnœa, not very prominent at first; fever.	Yes.	180	Rent two inches long at the level of the bifurcation of the trachea.	Cavity in the right side of the pos-terior mediastinal crossed by fibrous bands and filled with clot; over-lying pleura ad-herent.	Fitz,[8] 1877.

Table of 17 Cases of Rupture of the Apparently Healthy Œsophagus—Continued.

No. of case	Sex and age	Alcoholic	Previous history	Onset	Symptoms	Emphysema	Duration of life in hours	Shape and position of rupture	Results as determined by necropsy	Authority and date
9	Male, 17.	No	Attack of blood-poisoning a short time previously.	Sudden, during vomiting.	Hæmatemesis; intense feeling of suffocation; pain; collapse.	Stated to have been present before date of rupture; but?	4	Rent 1·5 centimetres long at one inch above the cardia.	Opened into the left pleural cavity, which contained gastric contents.	Taendler,[9] 1878.
10	Male, 53.	,,	Dyspeptic for many years with occasional vomiting.	Sudden, after feeling unwell for two hours after dinner.	Severe pain in left side and shoulder; collapse.	Not stated.	7	In posterior wall of the gullet one and a half inches long just above the diaphragm; through the mucous and submucous coats only above.	—	Adams,[10] 1878.
11	Male, 48.	?	Chronic gastric ulcer.	Sudden.	Vomiting, followed by pain and collapse.	No.	15	"Ulcer" two centimetres long by one centimetre wide in the posterior wall of the gullet two centimetres above the cardia and a little to the right; edges thickened, somewhat funnel-shaped.	Double pneumo-thorax; food in both pleural cavities; infiltration of the posterior mediastinum with gastric contents.	Linde-mann,[11] 1887.

No.	Sex, Age		History	Onset	Symptoms			Seat and size of rent	Condition of pleural cavity	Reference
12	Male, 32.	No	"Good eater;" drank little."	Sudden attack of nausea causing patient to tickle the fauces with his finger; during retching agonising pain and sensation of something having given way.	Pain; collapse; cyanosis.	Yes.	"A few."	Clean tear one centimetre long just above the cardia.	Left pleural cavity full of gas and food.	Wolff, [12] 1894.
13	Male, 47.	No	Vomiting; dyspeptic.	Sudden, whilst vomiting.	Pain; collapse; dyspnœa; voice higher pitched than usual; disappearance of cardiac dulness.	Yes.	13½	Sharply-defined rent one and a half inches long immediately above the cardia.	Left pneumothorax; in each pleural cavity was a pint of grumous fluid like gastric contents.	Harrison, [13] 1893.
14	Male, 59.	Yes	Drinking hard for a week previously to admission.	Sudden.	Pain; dyspnœa; effusion into the left pleural cavity.	Yes.	37	Sharply-defined "ulcer," one and a half inches long two inches above the cardia, involving the mucous membrane only below.	Accumulation in the posterior mediastinum, bursting into the lung but not communicating with the pleural cavity; gas in the mediastinum; acute pleurisy on both sides.	Lindsay and Lorrain Smith, [14] 1899.
15	Male, 43.	?	"Quite healthy."	Sudden; illness and vomiting after eating.	Collapse.	?	6	Rent two centimetres long in the gullet six centimetres above the cardia.	Food in the left pleural cavity.	Heintze, [15] 1900.

Table of 17 Cases of Rupture of the Apparently Healthy Œsophagus—Continued.

No. of case	Sex and age	Alcoholic	Previous history	Onset	Symptoms	Emphysema	Duration of life in hours	Shape and position of rupture	Results as determined by necropsy	Authority and date
16	Female, 62.	No	?	Sudden, after vomiting induced by salt and water.	Intense epigastric pain aggravated by swallowing; dyspnœa; collapse.	Yes.	22½	Rent five-eighths of an inch long one and a half inches above the diaphragm.	Lower part of the gullet was much softened; brownish fluid in the posterior mediastinum and the left pleural cavity; collapse of the left lung.	Bowles and Turner,[16] 1900.
17	Male, 40.	Yes	"Drunk every night for 20 years," much addicted to retching.	Sudden, probably during retching.	Pain not the most prominent symptom; intense dyspnœa; cyanosis; collapse.	Yes.	About 10	Slit-like rent 1·5 centimetres long in the anterior surface of the gullet just above the diaphragm, prolonged into the stomach by a fissure in the mucosa.	Contents of the stomach in the posterior mediastinum and the left pleural cavity; collapse of the left lung; acute pleurisy of the back of the right lung; gas in the mediastinum and the pericardium.	McWeeney, 1900.

1 Atrocis nec descripti prius Morbi Historia secundum medicæ Artis Leges Conscriptæ. Lugd. Batav. 1724.

2 Medical Commentaries. Edinburgh. 1788. Dec. II. Vol III. P. 308.

3 Guy's Hospital Reports. 1843. Second Series. Vol. I. P. 113.

4 Medicinische Vereinszeitung in Preussen. 1858. No. 39, No. 40, and No. 41

5 Ueber die Rupturen der Speiseröhre, Inaugural Dissertation. Königsberg, 1867.

6=The Lancet. Sept. 4th. 1899. P. 337.

6 Dublin Quarterly Journal of Medical Science. 1870. Vol. I. P. 311 (gives literature).

8 American Journal of the Medical Sciences. 1877. P. 17 (gives literature).

9 Deutsche Zeitschrift für praktische Medicin. 1878. No. 52.

10 Transactions of the Pathological Society of London. Vol. XXIX. P. 113.

11 Münchener Medicinische Wochenschrift. 1887. No. 26.

12 Medical News. 1894. No. 19.

13 The Lancet. April 8th. 1894. P. 784.

14 Lindsay. Transactions of the Royal Academy of Medicine in Ireland. 1899. Vol. XVII. P. 53.

15 Freie Vereinigung der Chirurgen Berlins, Sitzung vom 12 Feb. 1900. Abstracted in the Medicinische Woche. 1900. No. 7. P. 63.

16 Brit. Med. Jour. 1900. Vol. I. P. 763.

To the cases of undoubted rupture of the œsophagus (seventeen in number) which have been sufficiently recorded for inclusion in the table there must be added, as almost certainly belonging to this category, yet not recounted in sufficient detail for tabulation, the cases of Williams[a] (1848), Oppolzer[b] (1851), Bailey[c] (1873), and Heyfelder.[d] A case recorded as rupture of the œsophagus by Colegrove,[e] the account of which is not accessible to me, seems to have escaped the notice of Fitz, who, writing in America, might have been expected to have come across it in his review of the literature.

The subject has been discussed and the literature up to date collected by my friend and colleague on the Examining Board of the Royal University, Professor Charles, of Queen's College, Cork, in 1870. This was in connexion with a study of the case that came under his own notice. In 1877 Fitz published the case above abstracted, which was under the care of Dr. Adams, of Baltimore. Fitz also took occasion to collect the literature up to date, and discussed it very ably, though I cannot agree with him in his exclusion of several records which appear to me to be genuine cases of intra-vital rupture, such as those of Boerhaave (Case 1 in table), Dryden (Case 2), King (Case 3), and Charles (Case 7). Dr. John Knott, of Dublin, has also treated of the subject in a very admirable way in an " Essay on the Pathology of the Œsophagus," which gained

[a] Transactions of the Pathological Society of London, 1848. Vol. I., p. 151.

[b] Wiener Medicinische Wochenschrift, 1851, p. 65. (The patient in this case was presumably a female who strained herself during ironing.)

[c] New York Medical Journal. May, 1873. (The patient in this case was a robust negro. There was a longitudinal rent three-quarters of an inch long one inch above the cardia. He lived 24 hours. ? Emphysema.)

[d] Sanitätsbericht ueber das Fürstenthum Hohenzollern-Sigmaringen. 1837. (The patient was a male drunkard. There was a rent of the size of a threepenny piece close to the cardia.)

[e] Buffalo Medical Journal. 1849 and 1850.

the gold medal of the Dublin Pathological Society at the close of the session of 1877. There is, further, a full notice of the accident and a discussion of its distinction from agonal and *post-mortem* œsophago-malacia in Zenker and von Ziemssen's " Cyclopædia of Medicine."[a]   Finally, Sir Morell Mackenzie has dealt with the subject in his work on " Diseases of the Nose and Throat," and extended our knowledge by a series of experiments the outcome of which I shall return to later.

A number of cases described or quoted as examples of this condition prove on examination to be examples of agonal or *post-mortem* œsophago-malacia.   Details of such up to 1877 will be found in the work of Fitz and that of Zenker and von Ziemssen, and references to some of these have already been given here.   In collating the records I have considered it necessary to eliminate two cases published by Stanley Boyd.[b]   One was that of a child, aged four months, who had been suffering from high fever and quick pulse, with an erysipelatous rash.   Difficulty in breathing came on two hours before death.   There was no emphysema.   At the necropsy an aperture two millimetres in diameter was found midway between the bifurcation of the trachea and the cardia.   For a short distance above and below it the circular muscle fibres were exposed between two separated longitudinal bands.   Except for several narrow clots about an inch long, lying in furrows between the longitudinal folds, no morbid change was detected in the gullet.   At the necropsy extravasation of gastric contents is not mentioned.   The left pleural cavity was normal; the right contained an ounce of bloody fluid; the lungs were not collapsed.   The committee (Dr. J. F.

[a] English edition.   1878.   P. 90, et seq.
[b] Transactions of the Pathological Society of London.   Vol. XXXIII. P. 123.

Goodhart and Mr. H. T. Butlin) to which the specimen was referred reported on it as a case of " gastric solution," and from the age of the patient, her previous illness, and the absence of emphysema and of extravasation of gastric contents, I have little doubt that the case was an example of agonal œsophago-malacia.

Boyd's second case was that of a girl, aged eighteen years, who was the subject of Addison's disease, and who had suffered from persistent vomiting for several months. There was no sudden pain, no pneumothorax, no emphysema, and no dyspnœa. At the necropsy there was a longitudinal rent five centimetres long in the left side of the œsophagus immediately above the cardia; part of the overlying pleura had disappeared, and "this must have been due to digestion." The stomach showed some deep circular erosions and black lines marking the course of the vessels. The same committee reported on this specimen also, and found that "the mucous membrane at the level of the opening was dark and thickened as if from pre-existing disease, but the slit-like character of the opening and an uneven furrow between the longitudinal rugæ parallel to it are suggestive of gastric solution. But it seems probable that the œsophagus had been weakened by pre-existing disease and gastric solution, or both together, and had given way during the last few hours of life, and we think the specimen may serve to call attention to the occurrence of gastric solution during the enfeeblement immediately preceding death—an occurrence which is probably not very uncommon, which has never yet been adequately described, and which has produced within our knowledge most puzzling appearances." These reports manifestly place the cases in question outside the category of spontaneous rupture of the apparently healthy œsophagus. On the other hand, one meets with cases described under the

name of ulcer which undoubtedly belong to the category
now under notice. Lindemann's (Case 11 in table) is one
of these, and the case reported by Professor J. A. Lindsay
and Professor Lorrain Smith (Case 14) is another. To the
courtesy of Dr. Lorrain Smith I am indebted for an oppor-
tunity of examining the specimen, which is preserved in
the pathological collection at the Queen's College, Belfast,
and have been able to convince myself that it is of a similar
nature to my own. A solution of continuity in the wall of
any tubular viscus is by many pathologists termed an
"ulcer," especially when gaping of the sides of the rent
suggests loss of substance.

GENERAL FEATURES OF THE CASES.

Sex.—Of the 17 cases 16 were those of men : one of the
non-tabulated cases (Oppolzer's) was that of a woman.

Age.—The subjects were mostly men in the prime of life,
the average age of those of whom it is recorded being 42
years.

Alcoholism.—This seems to be a predisposing cause, and
in 8 of the 17 cases there is a distinct history of excessive
drinking.

Vomiting.—In eight of the cases this was of frequent
occurrence, whether the result of excessive eating or drink-
ing or induced by emetics. It is, however, as an exciting
cause that vomiting is especially prominent in connexion
with rupture of the oesophagus, for in every one of the cases
tabulated the accident seems to have occurred either during
vomiting or whilst the patient was straining to accomplish
the act (retching).

Symptoms.—In a number of the cases there was a distinct
feeling that something had given way within, and in all
there was pain, usually of the most agonising character,
speedily followed by collapse and nearly always associated

with dyspnœa. The position adopted by the sufferer was characteristic—sitting up with the trunk stooped forward as much as possible. The pain was usually aggravated by swallowing and sometimes by eructation. The most striking of all the symptoms and one of the most constant is emphysema. It appears first in the neck spreading up to the face, causing more or less obliteration of the features, and downwards over the trunk, reaching to the scrotum and thighs. The symptom was present in 12 of the cases and probably in several of the others, but the records of some of these are imperfect [Adams (Case 10 in table), Taendler (Case 9), and Heintze (Case 15)]. These characters make up an extremely well-marked and very unusual clinical picture, which, once seen, is indelibly imprinted on the recollection.

Duration of life.—Fitz's case (Case 8 in table) survived by far the longest—seven and a half days. The other 15 cases in which the duration is stated lasted on an average only 17 hours.

Position and shape of rupture.—In all the cases save that of Fitz the opening was immediately above the diaphragm, and was often prolonged upwards or downwards by a sort of fissure in the mucous membrane. This feature was especially well marked in my case. Save in the case of Boerhaave (Case 1 in table) the shape of the rupture was a longitudinal slit opening usually into the left pleural cavity, sometimes into both, occasionally (Lindsay and Lorrain Smith, Case 14 in table) into neither.

Etiology.—Charles in his very able paper[a] considers that "the rupture followed softening which may have resulted from chronic inflammation of the stomach and lower third of the œsophagus. The continued ingestion of alcohol probably induced a chronic gastritis or gastro-enteritis, the

[a] Loc. cit.

inflammation involving also the lower third of the œsopha-
gus. Softening of the mucous membrane occurred as a
consequence. . . . Immediately preceding or accom-
panying the vomiting there may have been temporary
spasm of this tube resembling the 'hour-glass' contraction
of the uterus, and under these circumstances the contents
would be impelled against its parietes close to the cardiac
orifice." This view is practically identical with that sub-
sequently adopted by Zenker and von Ziemssen. Fitz[a]
considers that "two factors are essential—the impaction of
a foreign body in the œsophagus and the exercise of great
muscular force in the attempts to remove it." This opinion
is manifestly incorrect, inasmuch as the factors in question
were present only in two of the cases—that of Meyer (Case
4 in table) and his own.

A much better grounded opinion is that of Zenker and
von Ziemssen,[b] who look upon rupture as the consequence
of a digestive softening of the œsophagus occurring *intra
vitam* in persons who are quite well otherwise. They lay
down the following conditions as pre-requisite for the pro-
duction of the softening:—(1) Regurgitation of stomach-
contents rich in pepsin and acid; (2) protracted retention
of regurgitated food in the œsophagus; and (3) cessation
or great weakness of the circulation. The first of these
conditions occurs when the stomach is over-distended, or
in association with attempts at vomiting. The protracted
retention would be realised if there were diminished mus-
cular energy in the œsophagus, such as might readily be
occasioned by the exhaustion due to continuous and violent
vomiting. The local circulatory disturbance is harder to
account for. Zenker and von Ziemssen think that the
œsophagus, on account of its much less abundant blood

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[a] Loc. cit. P. 34.
[b] Loc. cit. Vol. VIII. P. 106.

supply, is proportionally less protected against the gastric juice than the stomach, and, as regards the nature of the disturbance, the authors reject infarction and embolism, curiously enough omitting to mention thrombosis, which, in view of the frequency of varicose veins in the lower part of the gullet, seems the most probable cause. They speak of a "spastic ischæmia," and conclude as follows:—"And hence, accepting Andral's witty remark that in consequence of varied emotions the stomach, quite as well as the skin, may now turn pale and now be suffused, we shall certainly ask whether the striking pallor of the face and lips during vomiting does not extend to the stomach and œsophagus. This ischæmia may not ordinarily extend to a degree where the tissues would be exposed to the action of the gastric juice, but an unwonted increase in the same would open the door for a catastrophe. After all we have said we hold that the view is well founded that all cases of spontaneous rupture of the œsophagus may be referred to an intra-vital œsophago-malacia."

Mackenzie considers that the immediate cause of rupture is vomiting, and that "vomiting only causes rupture when the contents of the stomach cannot be expelled through the gullet at the same rate that they leave the viscus. . . . It is probable that some temporary obstruction near the upper end of the gullet preventing the flow of fluid matters from the stomach is the essential feature in rupture." He then points out that "to determine the cause of this obstruction is not always possible. In two cases, as already remarked, a foreign body was impacted in the œsophagus, but these were exceptions. In all the others the obstruction, if present, must have been due to something inherent in the tube itself. This is probably to be found in strong contraction of the circular fibres of the gullet at the upper part of the œsophagus. In two cases—those of Fitz (Case

8 in table) and of Wilkinson King (Case 3)—there was tetanic spasm, affecting in the one the flexors of the limbs, and in the other the abdominal muscles; and it need hardly be pointed out that if such a condition existed at the same time in the muscular walls of the gullet rupture would be likely to take place." In writing the above Mackenzie must have forgotten that the cramp did not come on till long after the occurrence of the rupture—on the seventh day of the illness in Fitz's case, and after the onset of pain and dyspnœa in that of Wilkinson King. Mackenzie endeavoured to found his view on a basis of experiment by testing a number of normal gullets removed *post-mortem* in order to find out at what point and in what manner they underwent rupture when overstrained by excessive pressure from within. He concluded (1) that rupture by direct pressure applied within the œsophagus always takes place in a longitudinal direction; (2) that the rent never occurs in the upper part of the tube, and in most cases is confined to the lower third; and (3) that the mucous membrane offers greater resistance to strain than the muscular covering.

Before dismissing from our attention the valuable work of Mackenzie on this subject, it is only right to say that, in rejecting the auto-digestion theory of Zenker and von Ziemssen, he has quite failed to grasp the exact nature of their position. He quotes them as considering that the accident results chiefly from "*intra-mortem* œsophageal malacia," or softening of the coats from peptic solution in the last hours of life. But the German authors distinctly lay down[a] "that œsophago-malacia may be developed in rare cases *intra vitam* in a patient who is perfectly well, without any connexion with any preceding serious disease, and form the basis of the so-called spontaneous rupture of the œsophagus."

[a] Loc. cit. P. 105.

That intra-vital digestion is not the sole cause is clearly proved by the uniformly longitudinal form of the aperture and its sharply-defined edges—characters which are just the opposite of those met with in gastro-malacia. That pressure from within cannot be the sole cause is, I think, evident from the exceeding rarity of the accident despite the frequency with which the œsophagus is distended by relatively enormous foreign bodies.

The conclusion to which I have arrived as the result of a careful study of existing data is, that the two main factors that are operative in causing rupture of the macroscopically normal gullet are (a) softening of the coats, and (b) sudden increase of pressure from within. The softening is due partly to intra-vital digestion, and partly (at least in the case which I observed) to inflammatory infiltration. The intra-vital digestion is to be accounted for by (a) circulatory disturbance, which in my case took the form of venous thrombosis, and (b) prolonged sojourn of peptic matters in the gullet from prolonged retching. The increased pressure from within is doubtless ascribable to the violent propulsion of the gastric contents into the lower part of the gullet whilst its upper outlet is obstructed by the contracted state of the muscle— in other words, to want of co-ordination of the muscular action of the tube, probably due to exhaustion from prolonged over-activity. Whether a localised phlegmonous œsophagitis—for that is the condition which existed in the case now recorded—is a constant factor in these cases, it is, of course, impossible to assert in the absence of microscopical details of the other cases. I believe I may lay claim to be the first to establish the existence of this condition as a possible cause of rupture of the apparently healthy gullet.

SECTION OF STATE MEDICINE.

INFANTILE INSANITY.

By WALTER BERNARD, F.R.C.P.I. (LONDONDERRY).

THE importance of studying the science and art of influence in the peculiarly impressionable epoch of infant life, during its many-sided rapid periods of evolution, has hitherto been practically disregarded.

Here, in our first lines of defence, it is not to the specialist we have to look for aids, and for solving difficulties. Moreover, at this very starting point of life leaders of thought—asylum doctors and hospital teachers—are not in daily touch with the groundwork of clinical domestic observations in the earliest months of existence. The family doctor alone is placed in the position for disciplining the faculties by his observed facts, and while engaged in this work, for the future culture of the world, he elevates those who carry out his directions in mental sanitation, practical life, knowledge, and truth. Besides, he holds the key to the family pedigree and ancestral history. His insight, extended experience, and close observations enable him, at this very early stage, before mental action and mentation are evolved, to control inherited conditions.

Practitioners who have so much in their power to make life physiological and real can prove by illustrations to the families of the earth that the lower elemental parts, out of gear in the first few months of life, can be raised out of automatism while ascending the rounds of the ladder, before the scholastic period.

Directive impressions conveyed to the infant for controlling, coercing, limiting, and encouraging to obedience, by well-timed laws, will tend to blot out aimless movements. To show that laws educate at the cradle side of life, correctional movements become more steady, and give signs that a mental advance has already commenced. But unless we persevere, in this our first encouragement, we cannot hope to be rewarded, Efforts, though tedious and wearying, will promote interest, as the non-rational inherited instincts begin to fade away. As growth advances complications we may expect, for slight physical ailments may call into action, especially when the body is not normal, mental predispositions. A nettle rash, a peripheral neuritis, as in herpes zoster, or a transient congestion, so common in a fatigued or growing brain, may excite changes in disposition which have again to be remedied.

Many children are deprived of the chance of not committing suicide later on, or spending some time in gaol, or their lives in a lunatic asylum, because the parents are kept in ignorance.

Let us safeguard the dangerous by casting them into the mould, and at the onset of existence deal with the whole being, while, with the assistance of the mother, we build up the sound elements, and the abnormal, which underlie the normal functions, will degenerate.

It should be sent forth to the world that those born with insane propensities can be made, by judicious training, not only able to take care of themselves, but good citizens, thereby proving to the world at large that heredity is not an unsurmountable barrier.

Through the want of practical knowledge and professional interest it is difficult to awaken those in power to this vital question, which so much concerns the nation at large. Hitherto our efforts have been unsuccessful, but since

Connolly's unanswerable arguments, which he sent forth so far back as 1862, facts have come out in a clearer light. And now, we hope, after so many years of effort, the Dublin School will make some practical move in formulating rules of guidance. May I be permitted to suggest that this Section call upon the Council of the Academy to take action in the framing of rules for the guidance of practitioners.

A comprehensive scheme, without undue elaboration, would, as far as my experience goes, be a valuable guide to the family doctor, whose advice would be readily realised and accepted by level-headed mothers against this appalling avoidable evil. Mothers, who, before doctors and nurses, are frequently the first to discover mental and physical infantile defects, are most willing to receive instructions for eradicating what they often feel would, very probably, end in lifelong regrets.

On the following grounds we ask for help :—

1st. Reformatory influences must commence at home.

2nd. That no rules have been framed, sent forth, and established for controlling the earliest forms of insanity at the onset of existence, and before the scholastic epoch.

3rd. That on preventive principles the earliest diagnosis of insanity in infantile life is of vital importance to the patient, the friends, the nation, and the tax-payer.

4th. That the sequent instances of three generations have declared by manifest examples that if, in the beginning of life, attention be paid to peculiarities in early infancy disordered states of the mental faculties can be remedied and blotted out, which if unchecked incur ruin, and bring a plague to the family and neighbourhood.

Though on former occasions I brought this subject before this Section and other medical meetings, and though my paper to-night may be looked upon as a mere recital or re-hearsal of what I had already brought forward, yet the

question is of such vital importance that I feel it should not be allowed to drop.

We should never lose sight of the fact that the great object of civilisation is the happiness of the people.   To quote our own historian, Lecky, who says, " Its foundation is laid *in pure domestic life*, in commercial integrity, in a high standard of moral worth, in public spirit, in simple habits, in courage, in uprightness, and a certain soundness and modera- tion of judgment, which springs quite as much from character as from intellect."

Dr. Conolly Norman said he had listened in vain for any practical suggestion from Dr. Bernard.   He had spoken with too much generality.   A great deal was heard about " insane predis- position," and it should interest us all, for we all have it.   It was a very short and obscure family which did not contain many lunatics.   Dr. Bernard had employed another vague phrase, in constant use, and to which it was difficult to attach any definite meaning—" judicious training."   We were told lately that a British youth leaving an university had about as much education as an eight year old German child.   Which system was right ?

Dr. Symes said feeble-minded children were very different from idiotic children, but he thought we did not distinguish between the two classes in this country.   He thought many of those charged with such offences as causing fires, &c., suffered from some mental defect.   In the homes for children to which he was physician he divided all the children into the following six classes :—(1) Ordinary normal children, in health ; (2) children physically but not mentally defective ; (3) defective and feeble-minded children incapable of attending school; (4) epileptic children ; (5) blind and deaf chil- dren ; (6) idiots and imbeciles.

Dr. Dawson agreed with Dr. Conolly Norman's remarks as to the excess to which the theory of heredity is carried nowadays. No doubt, in certain cases, there would be no difficulty in making out a neurotic heredity, and in these cases prophylaxis should be employed if possible.   He (Dr. Dawson) thought Dr. Symes had missed the point of Dr. Bernard's paper.   Dr. Bernard had referred to extreme early infancy.

DR. DOYLE thought self-control was the point needing greatest emphasis. He had seen very marked improvement effected in a case which had been sent to an institution in Holland where the patients are taken charge of by farmers, and where no education is attempted, the patients being chiefly employed in manual labour.

SIR FRANCIS CRUISE thought Dr. Bernard's paper one of great importance in directing attention to the mental condition and proper mental training of children. He had seen children of two and three years of age whose mental condition pointed to insanity, and who ultimately proved to be insane. He was strongly convinced that a great many children are insane.

DR. LITTLE hoped Dr. Bernard's paper was only a preface to a work on the subject. No advance would be made if they were content to deal with generalities. Undoubtedly, a great deal could be done in the training of children who had a tendency to grow up imbeciles. About fifteen years ago a boy came under his notice who was growing up an imbecile. He was sent to an institution near London, and is now an officer in the army.

SIR CHARLES CAMERON referred to the work being done by the London School Board in the training of children with impaired intellects. The children are examined by the Medical Officers of the Board, and special classes have been formed for the purpose of teaching those with mental defects.

DR. BERNARD, replying, said the perceptive faculties do not begin to dawn until the dentition period, and the infant could be ruled and controlled in the same way as an animal. The moment the child is born the doctor should ascertain if it is physically normal. Then the cry and the movements of the hands and legs should be watched. Certain rules of guidance should be laid down for the mother and nurse, and so the infant automaton could be taught to observe order.

ON COMMERCIAL PEPSIN.

By SIR CHARLES A. CAMERON, C.B., M.D.;
Professor of Chemistry, R.C.S.I., &c.

THE enzymes termed pepsin and trypsin are expensive substances used as aids to digestion. Pepsin is obtained from the mucous membrane of the pig, sheep, or calf. Trypsin, or enzyme, which, like pepsin, is a proteolytic ferment, is procured from the pig's pancreas. Pepsin is an official preparation of the "British Pharmacopœia," the dose being from 5 to 10 grains. It is, however, much more frequently employed as glycerin of pepsin (*glycerinum pepsini*)—a solution of pepsin in water, hydrochloric acid, and glycerin. Of this solution 1 drachm contains 5 grains, or 1 cubic centimetre, 0·0914 gramme.

Trypsin is not used in a separate state, but it is the principal constituent of the official liquor pancreatis. This is a solution of the non-fatty part of the pancreas in alcohol of 20 per cent. strength.

Great care should be taken in the preparation of pepsin, and the stomachs which yield it should be fresh and healthy. If it is heated much above 50° C. its digestive properties are impaired, and at 100° C. completely destroyed. The same observations apply to trypsin.

According to the "Pharmacopœia" pepsin should dissolve 2,500 times its weight of hard boiled white of egg. The process, as laid down in the "Pharmacopœia," is as follows:—12·5 grammes of white of egg, 125 cubic centimetres of acidulated water, containing about 0·2 per cent. of hydrochloric acid, and 0·005 gramme of pepsin are

digested together at 105° F. (40·5° C.) for six hours, and shaken freely, the coagulated white of egg dissolves, leaving only a few small flakes in an almost clear solution. There are some details to be attended to which I need not particularise.

As regards the pancreatic solution, it is tested as follows:—If 2 cubic centimetres of the solution, together with 0·2 gramme of sodium bicarbonate and 20 cubic centimetres of water, be added to 80 cubic centimetres of milk, and the mixture be kept at 113° F. (45° C.) for one hour, coagulation should no longer occur on the addition of nitric acid.

By a recent order of the Local Government Board for Ireland the Guardians of the Poor Law Unions are required to have specimens of the drugs supplied to their infirmaries and dispensaries periodically examined. Since the 27th of June, 1899, 21 specimens of glycerin of pepsin have been sent to me for examination. On that date a specimen received from Shillelagh Union was found to possess no digestive properties whatever—it was absolutely inert. In July a sample received from Galway Union was a fairly good one. A second sample from Shillelagh Union was little superior to the first; it came to hand on the 29th July. A sample from Gorey Union, examined in August, had one-half the digestive power which it should possess. In the same month a sample from Athy Union proved to be practically worthless. A specimen received in August from Sligo Union was found to be unfit for use. A specimen from Galway Union was tested in September. Five times the quantity of the glycerin of pepsin specified in the "Pharmacopœia" did not quite digest the prescribed quantity of egg albumen. In September a specimen from Armagh Union was found to be worthless. In September three specimens were received from Swin-

ford Union.   One had lost by far the greater portion of its
digestive power, and the others were practically useless.
A sample from Downpatrick Union, received in September,
was practically useless.   In September a specimen was
examined for Tullamore Union; it possessed one-tenth only
of the digestive power.   A sample examined for Cavan
Union in September retained most of its digestive power.
A sample from Cookstown, tested in October, had one-
tenth only of the proper strength.   A sample received in
the same month from Limerick Union had lost nearly all
its fermentative power.   In November a specimen from
Carrick-on-Suir Union was found to possess the full power
of dissolving albumen which the " Pharmacopœia " ascribes
to pepsin.   In December a specimen from Shillelagh
Union proved to be practically inert.   One specimen of
liquor pancreatis was sent; it came from Cookstown Union,
and was practically useless.

In February, 1900, a specimen of pepsin examined for
Mullingar Union had no appreciable effect on albumen,
when used in the proportion mentioned in the Pharma-
copœia: employed in 10 times the prescribed quantity,
about three-fourths of the albumen were dissolved.

In March specimens of pepsin examined for Naas and
Donegal Unions were found to be as slightly operative as
the Mullingar sample.

A specimen of pepsin from Swinford Union, examined
in March, was found to possess only one-fourth the power
of digesting albumen which it should possess.

Pepsin examined in March for Magherafelt Union was
fairly good, as it dissolved 75 per cent. of the prescribed
quantity of albumen.

In March a specimen from Dunfanaghy Union when
used in ten times the prescribed quantity digested three-
fourths the proper amount of albumen.

A specimen of glycerin of pepsin examined in March for Athlone Union was found to be only slightly deficient in digestive power. Such also was the case with a specimen from Claremorris Union.

Three specimens of pancreatic liquor were examined in March—one from Donegal Union was good, the others from Dingle and Carrickmacross Unions were only slightly deficient in the power of coagulating milk.

It will be seen that out of 21 specimens of glycerin of pepsin tested only 4 were perfectly correct, 9 were wholly useless, and 8 had lost from 25 to more than 90 per cent. of their digestive power. There did not seem to be any difference between the samples due to temperature, as both good and bad samples came in hot and cold weather.

Of 5 specimens of pepsin itself, 3 had less than one-tenth the proper albumen dissolving power; two were deficient to the extent of 25 per cent. Of the 4 specimens of liquor pancreatis, one was correct, two were slightly defective, and one was useless.

As I was not informed as to the dates on which the samples were received in the infirmaries and dispensaries it is impossible to declare whether the want of digestive power was due to instability of the article or to original defect. In future the date on which the drugs are received will, I understand, be communicated to the analyst.

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Dr. J. W. Moore said it was astounding that drugs of such an inferior quality should be so extensively sent out to the Unions in Ireland. He supposed it was partly due to the downward competition of estimates.

Sir C. A. Cameron here remarked that in many cases the substance under discussion was the only drug defective out of many.

Dr. Ninian Falkiner said the last observation gave the key to the solution of the question. In the "British Pharmacopœia" of 1898 they found pepsin described as an enzyme obtained from the mucous

lining of the stomach of the pig, the calf, or the sheep. It was quite evident that this enzyme must be prepared by a very elaborate process, and this process was excluded from the last Pharmacopœia, so that there was no definition of pepsin except that it was a substance that would dissolve a certain amount of coagulated egg albumen. He thought it would have been better to have adhered to the descriptions of the manufacture of pepsin, which he briefly outlined, as found in the two previous Pharmacopœiæ. He referred also to the extraction of pepsin by means of glycerine, but added that some thought the activity of this substance depended upon the glycerine.

Dr. Delahodye said this paper showed the necessity for the step the Local Government Board recently had taken in insisting on a periodical examination of medicines as preliminary to recouping half the cost of the medicines. The system of presenting tenders had a great deal to do with the question, and formerly it was a regular scientific system to make up tenders for the Unions, so that the tendering was almost confined to one or two firms who made a speciality of it.

Sir C. A. Cameron, in reply, believed that in addition to the imperfect method of manufacturing the substance, its instability was in most cases a cause of its ineffectiveness. In many cases pepsin was the only deficient drug out of thirty or forty, and he was afraid that the pepsin sold everywhere was just as useless because the same contractors supplied the retail pharmacists.

SECTION OF ANATOMY AND PHYSIOLOGY.

THE PHYSIOLOGICAL EFFECTS OF PROTA-MINES AND THEIR CLEAVAGE PRODUCTS.[a]

By W. H. THOMPSON, M.D., &c.;

Professor of Physiology, Queen's College, Belfast.

[Read in the Section of Anatomy and Physiology, February 2, 1900.]

THE protamines, as is now well known from the work of Miescher, Kossel and others, constitute a group of the simplest proteids with which we are at present acquainted. They possess prominent basic characteristics, and on hydrolytic cleavage yield relatively few and simple products.

These substances have hitherto been sought for only in the male generative organs of certain fishes, but there can be little doubt that more extended research will show that the presence of similar, if not identical, bodies is of wide distribution in animal tissues.

Till now four members of this group have, with certainty, been identified. These are—(1) *Salmin*, discovered in the ripe testicle of the salmon by Miescher[b], with which *Clupein*, found in that of the herring, is probably identical; (2) *Scombrine*, obtained from the mackerel; (3) *Sturin*, from the milt of the sturgeon, and (4) *Cyclopterin*, from the sperma of cyclopterus lumpus (the common lump sucker). Our knowledge of the three latter bodies is to be ascribed to the work of Professor A. Kossel and his pupils.[c]

[a] With the exception of two experiments the whole of the following research was carried out in the Physiological Institute, Marburg.

[b] Verh. d. Naturh. Gesellsch in Basel. Bd. VI., s. 138. 1874. Also Archiv. f. Exp. Path. u. Pharm. Bd. XXXVII., s. 100. 1896.

[c] Zeitschr. f. Physiol. Chemie. Bd. XXII., s. 176. Bd. XXV., s. 162 u. Bd. XXVI., s. 588.

When treated by strong chemical reagents, salmin, clupein and scombrine yield the same cleavage products, viz.:—(1) arginin; (2) amido-valerianic acid; and (3) a small amount of unknown residue.

Sturin, on the other hand, differs somewhat from the foregoing protamines, and is believed to be somewhat more complex. When treated in the above manner it yields—(1) arginin; (2) histidin; (3) lysin; (4) amido-valerianic acid; (5) a small amount of unknown residue.

Protamines are of physiological interest from more than one point of view. On the one hand, a study of their chemical constitution promises to furnish a key to that of the more complex proteid molecule. On the other, it has been ascertained that the products which they yield on cleavage occur in considerable quantities in the substance which we have hitherto known as antipeptone.[a]

A study of the physiological properties of this latter substance has occupied the attention of several investigators, and it is in connection with such a research on my own part that the present investigation was undertaken. My observations were at first confined to a study of the physiological effects of the cleavage products, but were subsequently extended, at the desire of Professor A. Kossel, so as to include the protamine mother-substance. It is to be remarked that H. Kossel[b] had already observed that the protamines were fairly poisonous.

With the exception of cyclopterin, all of the protamines above mentioned, together with their cleavage products, were brought under observation. The whole of the material employed was generously placed at my disposal (for the most part in an advanced state of preparation) by Professor Kossel, except in the case of the protamines, combrine. For this,

[a] Fr. Kutscher. Zeitschr. f. Physiol. Chemie. Bd. XXV., s. 195–201. Bd. XXVI., s. 110–122. Bd. XXVIII., s. 88–97.

[b] H. Kossel. Zeitsch. f. Hygiene u. Infectionskrank. Bd. XXVII., s. 44.

as well as for much kindly advice, and assistance, freely accorded throughout the progress of the inquiry, I wish to express to him my sincere thanks. Scombrine I prepared from mackerel milt according to the method of Kossel.

METHOD OF INVESTIGATION.

The experiments were carried out on dogs, narcotised with a mixture of morphine and atropine, hypodermically administered, and subsequently anæsthetised with ether-chloroform mixture. The substances were introduced from a burette, directly into the circulation, by means of a cannula placed in the femoral vein. The effects on blood-pressure and on respiration were observed, the former by means of an ordinary mercurial manometer placed in connection with the left carotid artery, the latter with the aid of two Bert-Marey's tambours, one of which recorded thoracic respiratory movements, the other abdominal (diaphragmatic) movements.

In addition, observations were made on the rapidity of blood coagulation before and after the injection of the substances, as well as on the number of circulating leucocytes. Blood for these purposes was drawn from the femoral artery.

EFFECTS OF PROTAMINES.

The sulphates of the different protamines were in the first instance converted into carbonates, and having ascertained that the solutions of these latter were free from all traces of the inorganic reagents employed in the process, they were evaporated to dryness on the water bath. The drying was subsequently completed in the exsiccator. The carbonate was then dissolved in physiological salt solution, and a sufficient quantity of dilute hydrochloric acid added drop by drop till an almost neutral reaction was obtained. The solution was then reduced to the required strength (1 per cent.) by the addition of a sufficient quantity of physiological salt

solution and heated on the water bath, kept at 37° C., till required for injection. The material was thus introduced chiefly in the form of chloride of protamine.

1. *Blood-pressure.*—A very marked and comparatively sudden fall of blood-pressure was brought about soon after the protamine entered the circulation. This speedily ended in death if more than a certain quantity were administered. The lethal dose proved to be very small. For a dog of ten kilos in weight the maximum quantity of clupein that could with safety be administered in one injection proved to be under 0·2 grm. (0·15–0·18); of sturin rather more than this amount (0·2 grm. to 0·23 grm.).

Fig. 1 represents the effects of clupein.
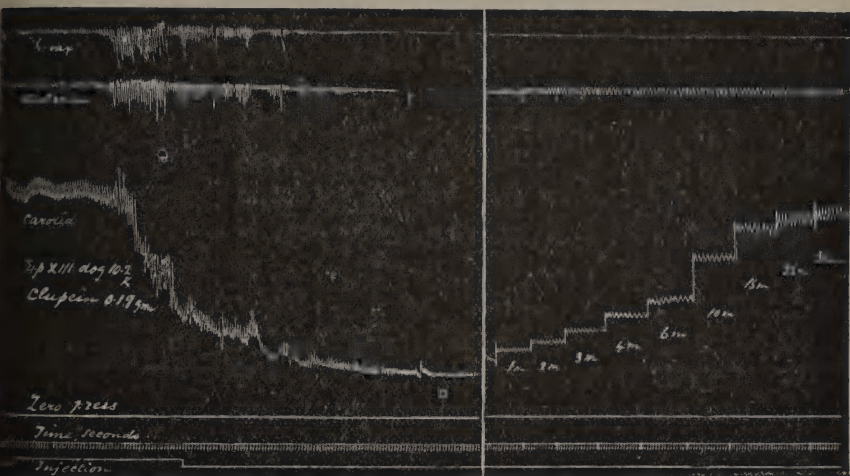
Fig. 1.—Showing the effects on blood-pressure and on respiration of a dose of clupein.

If a sublethal dose had been given, blood-pressure gradually returned, and as a rule had reached its normal level in twenty-five to thirty minutes. A second dose could now be administered, when a similar fall of blood-pressure reappeared.

A somewhat larger dose could even be given without causing lethal effects, but the amount of immunity was relatively small. It was much less, for example, than that which follows the injection of a single dose of an albumose large enough to lower blood-pressure to a similar degree. Fig. 2 represents the effects of a second dose of clupein in the same experiment as that from which Fig. 1 has been taken.
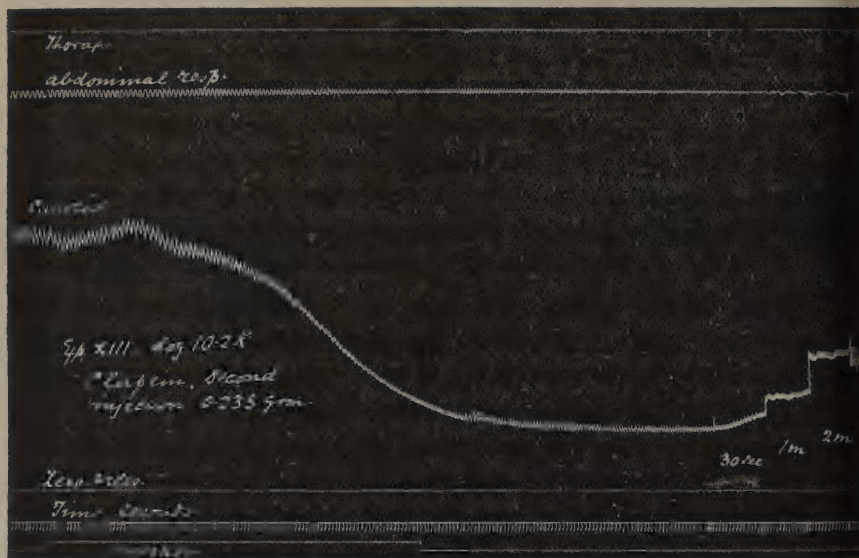
Fig. 2.—Showing the effects of a second dose of clupein.

Other protamines yielded identical results. The following curve (Fig. 3) is taken from an experiment in which sturin was injected.

In this tracing abdominal respiration was recorded by an ordinary Marey's drum, thoracic respiration by the Bert-Marey form. This accounts for the movements being opposed in the two upper curves.

I have elsewhere shown[a] that the vaso-dilating effects of albumoses are to be attributed mainly if not entirely to peripheral influence on the walls of the blood-vessels. It appeared desirable to ascertain if protamines acted in a similar way. This was accordingly done, the method employed being a modification of that originally adopted in
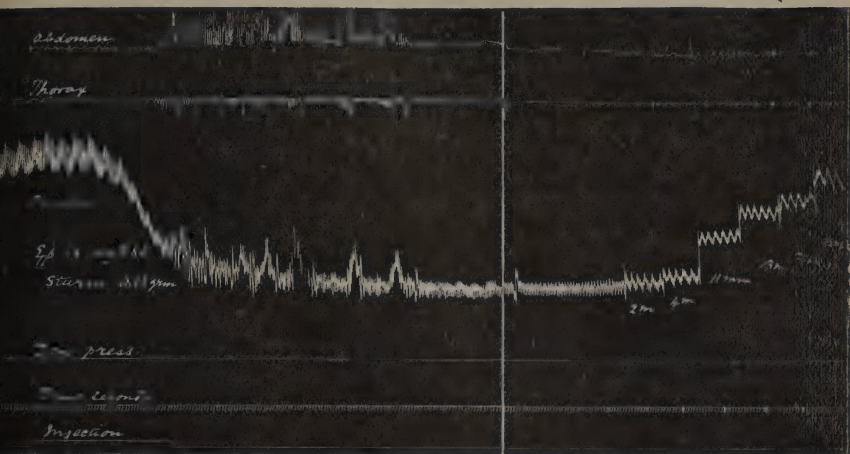
Fig. 3.—Showing the effects of sturin on blood-pressure and respiration.

the case of the albumoses—a splanchnic nerve was divided and its peripheral segment armed with electrodes. The effect on blood-pressure of a given excitation was then observed before and after the injection of a dose of protamine. Fig. 4 represents the results of this experiment.

The left segment of the above figure shows a considerable rise of blood-pressure resulting from a short excitation of the left splanchnic. Divisions two and three show little or no influence from the same excitation after the injection. Two minutes later, in division four, a slight rise is obtained,

[a] Journal of Physiology. Vol. XX., p. 455-473. 1896. Vol. XXIV., p. 374-409. 1899. And Vol. XXV., p. 1-21. 1899.

but with a stronger current, while in the extreme right end of the figure peripheral irritability has once more returned, as shown by the results of an excitation of the original strength made eight minutes after the protamine injection.
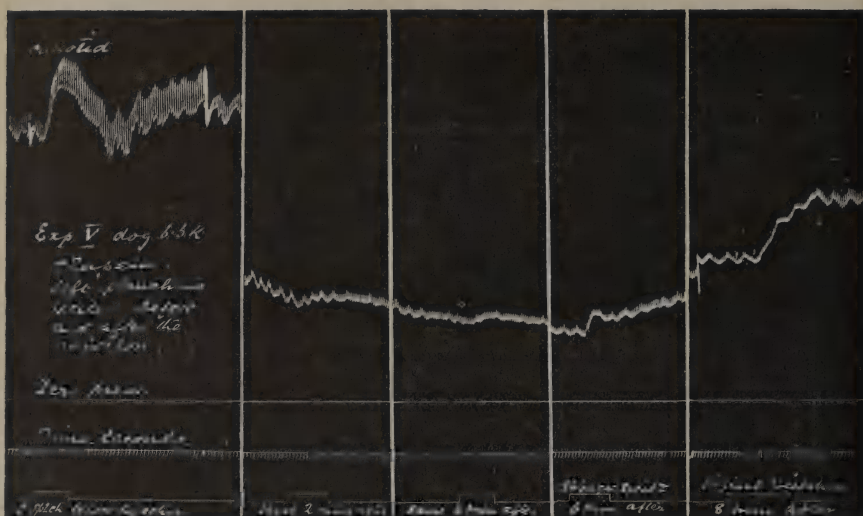
Fig. 4.—Composite tracing made up of segments from the curve of Exp. V., showing the effects of excitation of the left splanchnic upon carotid blood-pressure before and at different periods after an injection of clupein. Between the first and second segments of the tracing the fall of pressure due to the injection had occurred.

It must, therefore, be accepted that the substances here dealt with act peripherally or locally on the walls of the blood-vessels in a manner similar to that in which proteoses act. The possibility of a central action has not however been excluded, and no experiments were made to determine this point. Whether these substances exert a direct weakening influence on the muscle of the heart has also not been specially examined. It is quite probable that they do however; indeed it seems, as will later appear, that all varieties

of muscular tissue are more or less paralysed while their influence lasts.

2. *Respiration.*—Early in the progress of the research it was seen that these substances exerted a peculiar influence on the function of respiration. Death from an overdose was, in fact, found to be due to an arrest of the respiratory movements, and could be prevented by employing artificial respiration. With non-lethal doses, and when records were taken of both thoracic and abdominal respiration, it appeared, however, that during the earlier part of the injection, corresponding to the fall of blood-pressure, the respiratory movements were greatly exaggerated and quickened both thoracic and abdominal. This is shown in the following as well as in other figures.

Fig. 5.—Showing the influence of salmin on respiration and on blood-pressure.

Then came a period of quiescence, ending in almost complete standstill. Up to this stage both thoracic and abdominal movements suffered like effects; but now a return of active abdominal movements gradually supervened, these

at the same time becoming deeper and slower. Active thoracic movements remained absent while the effects of the drug lasted. Movements of the thoracic wall, it is true, did occur in most cases during this last period, but they were purely of a passive nature. This was evident to the eye, and is also manifested in many of the tracings.

In the production of the abdominal type of respiration not only was the diaphragm engaged but apparently also the muscles of the abdominal wall.

If a second dose of protamine were injected during the period of vigorous abdominal respiration, these movements became gradually less and less, and finally ended in complete arrest. From this condition recovery was not obtained. Fig. 2 illustrates the effects of a second dose in this respect.

It must be admitted that the respiratory phenomena are difficult to account for. The sharp separation of the two muscular acts—elevation of the thoracic wall and descent of the diaphragm, the one being paralysed, the other undergoing compensatory augmentation—would seem to indicate that the effect is produced by a central influence. On the other hand, I have no doubt that the protamines produce a temporary paralysing effect on striped muscles of the same nature as that they exert on smooth. The subject has not yet been worked out. I have, however, noticed that the animal's limbs are flaccid, and not moved by voluntary or reflex effort during the influence of the protamine.

3. *Blood Coagulation.*—This process was also influenced, and always in the direction of retardation. A single dose of protamine produced but little effect; after a second or third dose coagulation was, however, often delayed for thirty-six hours. It was never wholly abolished. The following table gives particulars.

Table I.—Showing the Influence of Protamines on Blood Coagulation.

Experiment	Weight of Dog in kilos	Substance	Doses in grams	Normal Coagulation Time	Coagulation Time after First Injection	Coagulation Time after Second Injection	Observations
III.	4·7	Clupein	(a) 0·142 (b) 0·185	8m. 10s.	44m. 30s.	Not observed	Dog died
IV.	10·45	,,	(a) 0·179 (b) 0·152	13m. 40s.	29m. 30s.	Not same evening	,,
V.	6·5	,,	Not noted	11m. 35s.	'Not in 30m.	—	—
XII.	11·0	,,	(a) 0·248 (b) 0·303	10m. 15s.	Jelly 63m. 30s. Solid 123m. 30s.	—	Dog died
XIII.	10·2	,,	(a) 0·190 (b) 0·235	12m. 20s.	35m. 20s.	Jelly 25m. 15s.	,,
XXII.	9·5	,,	0·25	9m. 10s.	Not in 40m.	—	,,
XXV.	6·0	,,	0·21	10m. 0s.	Not in 70m.	—	Dog lived
VII.	11·5	Sturin	0·187 0·216	19m. 45s.	45m. 50s.	Next morning	,,
VIII.	7·5	,,	0·5	18m. 40s.	Not next morning . Coagulation 2nd morning	—	Dog died
IX.	8·5	,,	0·22 0·252	9m. 18s.	39m. 50s.	Soft next morning	Dog lived
XV.	5·1	,,	0·115 0·182	11m. 10s.	37m. 45s.	Next morning	,,
XVI.	5·2	Scombrin	0·133	18m. 35s.	Jelly 192m. 30s. Next morning	—	,,

A similar retardation of coagulation was brought about by receiving blood into a test tube containing protamine solution. In carrying out this observation, as a rule three test tubes were taken, into each of which a few cubic centimetres of 1 per cent. protamine solution was poured. To these, varying proportions of blood were added, beginning with equal parts and ascending to three parts of blood to one of solution. The proportions were varied in different experiments and in all cases were judged by the eye. The first effect noticed was an increased brightness in the colour of the blood when added to the protamine solution. At the same time it was observed that in thin layers the film presented a granular appearance. On microscopic examination these granules were seen to be due to masses of red corpuscles, glued together, and somewhat distorted in shape. Soon a very rapid sinking of the red corpuscles set in, leaving a beautifully clear layer of liquid plasma (?) above.

The degree of retardation varied with the amount of protamine solution added. With equal parts, this lasted over night, only a very imperfect coagulation being found next morning. With a proportion of one of protamine to two of blood a solid coagulum in most cases had occurred during the night, the experiment having been made the previous afternoon. With a proportion of one to three coagulation was only delayed from three to four hours. It was remarked in all cases that the red layer at the bottom of the test tube coagulated a considerable length of time before the overlying plasma.

The protamine solution did not have the effect of destroying the leucocytes, nor was any obvious alteration seen in the structure of these corpuscles.

4. *Number of Circulating Leucocytes.*—A remarkable diminution in the number of colourless corpuscles was observed. Their disappearance corresponded in a general way to the degree of retardation observed in the process of

coagulation. It cannot, however, be maintained that the two phenomena ran absolutely parallel. Particulars are given in the following table for experiments with each of the protamines:—

TABLE II.—*Showing the Influence of Protamine Injections on the Number of Circulating Leucocytes.*

Experiment	Weight of Dog in kilos	Substance	Doses in grams	Normal No of Leucocytes	No. after First Injection	No. after Second Injection
XII.	11·0	Clupein	(a) 0·248 (b) 0·303	16,675	2,656	—
XIII.	10·2	,,	(a) 0·190 (b) 0·235	11,875	3,906	1,719
XXV.	6·0	,,	0·21	8,190	687	—
IX.	8·5	Sturin	0·22 0·252	10,000	10,000	5,937
XV.	5·1	,,	0·115 0·182	28,281	1,875	781
XX.	7·0	Salmin	0·152 0·230	18,750	5,469	—
XXI.	8 0	,,	0·24 0·262	17,344	7,344	4,062
XVI.	5·2	Scombrin	0·133	22,812	1,562	—

The decrease in the number of circulating leucocytes can hardly be attributed to destruction. This is indicated by the fact that in vitro such breaking up does not occur. Further, in one case (Exp. XXV.) it was noted that within three-quarters of an hour after the injection the number of leucocytes had returned to a slightly higher point than normal. The rate of coagulation had also returned to that observed before the injection.

Before leaving the subject of protamines it is necessary to add a few words regarding possible differences shown in their physiological effects. Clupein, salmin and scombrin are all identical in chemical composition, and showed no appreciable

difference in physiological action.   Sturin, on the other hand, appears to be less poisonous.   On looking down Table I. it will be seen that in no case in which sturin was injected did the animal die except one, while in many the dose employed, if it had been of clupein or salmin, would certainly have proved fatal.   This is of interest, since Professor Kossel believes that sturin approximates, by one stage at least, nearer to ordinary complex proteids than do the protamines of the other group, and is therefore deprived of a certain amount of the extreme toxicity which belongs to the simplest of these bodies.

EFFECTS OF THE CLEAVAGE PRODUCTS.

(*a*) *Protones.*—The first stage in the hydrolysis of a protamine results in the formation of a body to which the name protone has been given.   The protones differ from the protamines in containing two more molecules of water.   They are also more soluble than their parent bodies, and give no precipitate in alkaline solution with albumen or propeptone. It seemed not unlikely that in physiological properties the protones would also be found to differ from the protamines.

I accordingly prepared some protone sulphate from clupein sulphate by boiling with dilute sulphuric acid in the manner prescribed by Kossel.   This I then converted into carbonate, and subsequently injected in the same manner as in the case of a protamine—that is to say, the carbonate was dissolved in physiological salt solution and neutralised by the addition of a few drops of dilute hydrochloric acid.

Three experiments were performed with clupein protone, and all showed pronounced deviations from the effects of a protamine.   The chief difference consisted in the fact that a much larger quantity—nearly three times the amount—could be injected without approaching a fatal effect.   Thus half a gramme produced no more than a slight fall of blood-pressure

in a dog weighing eight kilos. Nor was respiration more than very slightly influenced. Blood coagulation was scarcely retarded, and the number of circulating leucocytes but little diminished. Fig. 6 gives a tracing from one of these experiments.

Fig 6.—Showing the effects of clupein protone on respiration and on blood-pressure.

A second dose of protone produces rather less effect on blood-pressure than the first one, but generally brings about arrest of thoracic respiration. Blood coagulation is also retarded, and the number of leucocytes diminished. But these two latter effects are never so pronounced as when a protamine is employed. The coagulation effects are seen in the following numbers taken from the average of the three experiments :—

Normal coagulation time   -   -   9 mins.   7 secs.
After first injection of protone   -   18   ,,   27   ,,
After second injection of protone   -   27   ,,   32   ,,

The influence on circulating leucocytes is shown in the

following figures taken as the average from two of the above
experiments :—

Normal numbers per cubic millimetre   -   12,475
Number after first injection of protone   -   11,395
Number after second injection of protone   -   2,140

In the conversion into protone the material therefore
loses its poisonous properties to a very great degree.

(β) *Hexone Bases.*—These bodies are the products of a
further degree of hydrolytic cleavage of the protamine mole-
cule as already stated, and comprise arginin, histidin and
lysin. The physiological action of all three was studied after
the same manner as in the case of the protamines.

Arginin was converted from the nitrate into the carbonate,
dissolved in normal salt solution, and its alkalinity reduced
by the addition of hydrochloric acid. Histidin and lysin
were prepared in the form of chlorides. The reaction of these
salts is acid. After solution in normal saline the acidity was
annulled by the addition of sodium carbonate solution.

None of these bases produced any effect on blood-pressure
or on respiration. Arginin and histidin slightly hastened
the coagulation of blood drawn from the vessels. This is of
interest in connection with the fact that antipeptone also
hastens blood coagulation. Lysin seemed to have no
influence on this process. In the test tube, also, arginin
solution slightly hastened blood coagulation, histidin solution
markedly did so. In one experiment arginin reduced the
number of circulating leucocytes from 12,031 to 4,219.
Lysin after a second injection from 16,094 to 11,562.
Histidin had no influence.

The number of experiments performed with these bases
was necessarily very small, on account of the difficulty of
preparing them in any quantity, while the amount employed
in each experiment was much greater than in the case of the
protamines. Two grammes each of the above substances was

injected in the experiments quoted. Three experiments were performed with arginin, one with histidin, and one with lysin.

The experiments, however, conclusively proved that the poisonous properties of the protamines do not reside in any of the hexone bases. Observations were also made on the effects which arginin and lysin exert on urinary secretion. The results are reserved for future publication.

(γ) *The Residue.*—It now became necessary to determine whether the poisonous properties were to be found or not in the residue left after cleaving off the hexone bases. With residue I include in this instance the amido-valerianic acid already mentioned.

Accordingly, Professor Kossel kindly had some clupein sulphate treated for me in the following way :—The substance was boiled for 8 hours in a reflux-condenser, with three times its volume of sulphuric acid, of the strength of one part of concentrated H_2SO_4 and two parts by volume of water. After the greater part of the sulphuric acid had been removed by barium hydrate, arginin was precipitated by sulphate of silver and barium hydrate after the method of Kossel. The filtrate was then freed from excess of barium by sulphuric acid, and from silver by sulphuretted hydrogen. Finally, the excess of sulphuric acid was completely removed by aid of the necessary amount of barium hydrate. The residue so obtained proved to be very hygroscopic.

Of the dried substance 0·37 grm. was taken and injected in the manner adopted throughout. To yield the above amount a far larger quantity of protamine had of course to be employed. If, therefore, the active ingredient was to be found in the residue, its poisonous properties ought to be very great. This was not so, however; on the contrary, the substance was found to be devoid of any obvious physiological effect such as those shown by the protamines, with the possible exception of a slight hastening influence on blood coagulation.

The toxic properties of the protamine must therefore be regarded as belonging to the constitution of the molecule as a whole. They are not found in connection with any of its ultimate cleavage products; moreover, the first stage of hydration effects a marked reduction of toxicity.

PHYSIOLOGICAL EFFECTS OF HISTONE.

It is known that a proteid with prominent basic characters can also be obtained from certain cellular tissues, such as the thymus of the calf.[a] To this body Kossel, who first discovered it in the nucleated blood corpuscles of the goose, has given the name of *histone*. Lilienfeld[b] has studied its influence on blood coagulation. It seemed desirable, however, to compare its effects on the animal body when introduced into the circulation with those of the protamines. At Professor Kossel's desire I therefore prepared some of this material from fresh calf's thymus and carried out two experiments therewith.
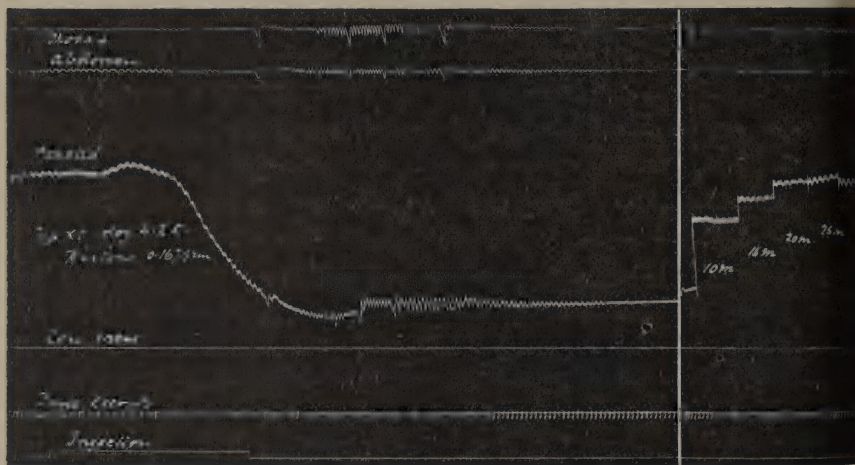
Fig. 7.—Showing the influence of histone on blood-pressure and respiration.

[a] Lilienfeld.   Zeitsch. f. Physiolog. Chemie.   Bd. XXI., s. 473.   1894.
[b] Zeitsch. f. Physiol. Chemie.   Bd. XX., s. 89.   1895.

Its effects proved to be remarkably similar to those of the protamines. Figure 7 is a tracing from one of the experiments.

Blood-pressure suffered a great fall, while respiration was also influenced in a manner closely resembling that caused by a protamine. Further blood coagulation was retarded in one of the experiments, and the number of circulating leucocytes largely diminished in both. The coagulation time for the two experiments is as follows:—

	Normal	After 1st Injection	After 2nd Injection
(1.)	10 min. 30 secs.	8 min. 20 secs.	jelly in 85 min.
(2.)	7 min. 30 secs.	15 min. 55 secs.	7 min. 40 secs.

The number of leucocytes in each case is as follows:—

	Normal	After 1st Injection	After 2nd Injection
(1.)	13·437	313	131
(2.)	16·094	2,006	469

The weight of the dog in the first experiment was 7·2 kilos, and the two doses 15 and 30 centigrammes respectively. In the second experiment the dog's weight was 4·2 kilos, and the doses 16·7 and 29·8 centigrammes.

Summary.

1. The protamines possessed marked toxic properties. This is manifested by a great fall of blood-pressure, by a retardation of blood coagulation and reduction in the number of circulating leucocytes, and by a peculiar influence on respiration.

2. The fall of blood-pressure can be accounted for by peripheral or local influence on the vessel walls, though it is probable that cardiac weakening also plays a part in its production.

3. The effect on respiration may also be attributed, in part at least, to local paresis of the voluntary muscles involved in

this act. It is probable, however, that a central influence comes into play as well.

4. When hydrolysed to the stage of protones, the poisonous effects are much diminished.

5. The final cleavage products—viz., hexone bases and residue—are wholly devoid of poisonous properties, which must, therefore, be ascribed to the constitution of the protamine molecule as a whole.

Before closing this contribution I have to express my sincere thanks to Dr. Plenge, Assistant in the Marburg Institute, for much assistance in making the observations here recorded, and in the carrying out of the operative procedures.

————————————

PROFESSOR COFFEY said it occurred to him, when thinking over Professor Thompson's former work, that there ought to be some parallel between the action of the protamine and the antipeptone, because antipeptone has now yielded some of the products that come from the protamine substance. Kutscher has established that antipeptone yields at least—if it is not a mixture of—arginin and other products. Is the action of antipeptone, as determined by Professor Thompson, the result of the presence of this arginin? How far will the action of antipeptone, of arginin, and of the protamine (which contains arginin) then coincide? But, as Professor Thompson showed, while the protamine substance itself has a very definite action, its products have no such action, and we are, therefore, face to face with the very interesting point that protamine substance which will yield arginin, lysin, and histidin has very pronounced physiological effects, while its products have not. Such a divergence in action among closely allied substances is illustrated by the contrast between the proteid of nutrition and the proteose, which is one stage of its digestion—the first an absolutely necessary and innocuous material, the other a poison.

DR. WALTER SMITH said it was interesting to notice that certain chemical reactions, such as Millon's and the Biuret, in every-day use in hospitals, were related to the existence of these protamines, so that researches such as those of Professor Thompson had an

interest for the physician as well as for the physiologist. One of the most interesting points was the different physiological effects of hydrolysis on protami nes and proteids. The proteids became more toxic when hydrolised, but the toxic activity of the protamines was diminished. As to possible pathological and therapeutical results, he thought it quite likely that in such problems as the action of antitoxic sera some help might be derived from these researches. Piperazin, a remedy in which he had no faith, had already been derived from these bodies.

Dr. Dawson said it was now established that certain depressed states of consciousness were almost always associated with raised blood-pressure. The means hitherto at hand for controlling this had given very good results in the treatment of cases, but were not satisfactory, in the fact that their effect was very brief. It would be very important if from these protamines one could be selected which would produce a fall of blood-pressure, and be more lasting in its effects, while devoid of risks.

Professor Thompson, in reply, said, with regard to the possible similarity between antipeptone and some of these cleavage products, when working at antipeptone he was astonished to find it had very little effect on blood-pressure and blood coagulation. It raised blood-pressure slightly, and hastened coagulation. He found arginin hastened blood coagulation, while its effect upon blood-pressure was practically nil—*i.e.*, it quite coincided with the effects of antipeptone. These substances reduced enormously the number of leucocytes in the circulation, but the leucocytes reappeared in about three-quarters of an hour; they could not, therefore, have been destroyed, nor have wandered out of the blood-vessels. Replying to Dr. Dawson, the fall in blood-pressure, produced by even a dangerously large dose, would not last more than half an hour. The expenses of the foregoing research have been in part defrayed by a grant from the Royal Society.

SOME POINTS IN THE ANATOMY OF THE DIGESTIVE SYSTEM.

By A. BIRMINGHAM, M.D.;
Professor of Anatomy, Catholic University, Ireland.

I HAVE recently carried out a systematic study of the digestive system in a series of ten bodies specially hardened by the injection of formalin, and entirely devoted to the purpose of this research. With the same object I have examined several other bodies hardened for different purposes, and as in many particulars my results are not in agreement with the accepted descriptions of the parts concerned, it may be of interest to submit some of them to this meeting, with the object of eliciting the views and experiences of other workers in this branch of anatomy.

There is not, I am sure, in the mind of anyone who has given it a fair trial, any doubt as to the value of the "formalin method" of hardening bodies for the purposes of topographical anatomy. I am aware that various objections have been urged against it, but I am inclined to think that these objections come solely from those who have not given this reagent an unprejudiced trial. For the method I would claim two great advantages:—In the first place, if properly injected soon after death it absolutely fixes the organs in the position, form, and condition in which they were at the time of injecting, and, as fixation during life is impossible, the next best thing is fixation soon after death. Secondly, it is incomparably superior to the ordinary method of examining the body without hardening, and without fixation of any kind, in which the opening up of the cavities, no matter how carefully done,

is certain to interfere with the shape and relations of the contained viscera.   It is also a great advance on the method of frozen sections—invaluable though it has been— for this allowed of an examination of parts as seen only on one plane of section, whilst the formalin method gives sections practically as good as those obtained from frozen bodies, and at the same time admits of the taking asunder, and putting together, of the parts shown in the sections, after the fashion of a child's model house.   In illustration of this latter advantage I exhibit a specimen of the pelvis, from which the various organs can be removed one by one and restored again at pleasure without interfering with either their shape or their relations. Such a specimen is, I would submit, a great deal more useful and more true to nature than any other preparation of this part.

Passing by the merits of the formalin method, I shall set forth briefly some of the chief points in which I find my results, obtained from hardened bodies, differ from those generally accepted.   In doing so I shall take the various parts of the digestive system in order.

THE SALIVARY GLANDS.

The Sub-maxillary Gland lies further back than usually taught ; it is in contact with the mandible from its angle to a point about an inch and a half (3·7 cm.) forward from the angle.   The posterior end of the gland is the most bulky part, and either abuts against, or lies close to, the sterno-mastoid.   Very often, too, it is overlapped by the lower end of the parotid gland, the two being separated by a process of the deep cervical fascia which extends from the angle of the jaw to the fascia of the sterno-mastoid.   The "deep process" leaves the deep surface of the gland anterior to its middle, the front of the gland presenting, as it were, a slit into which the posterior

border of the mylohyoid muscle fits.   The duct passes out of the deep surface about its middle, and runs forwards along the upper and deep aspect of the deep process.   The lingual nerve crosses inwards and forwards on the floor of the mouth beneath the duct, about opposite the second molar tooth.

The Parotid Gland is generally said to be separated from the sub-maxillary gland below by the stylo-maxillary ligament.   This is rarely or never the case.   The ligament separates it from the back of the internal pterygoid muscle, which presents not a narrow border, but a wide posterior surface lying almost in a coronal plane.   The importance of the "glenoid lobe," which is very small, is generally exaggerated ; a "pterygoid" lobe cannot properly be said to exist, as the front of the gland is flattened up against the back of the internal pterygoid referred to above.   The gland can without much difficulty be separated from the external carotid artery, which merely lies in a groove on the upper and anterior part of its deep surface.   On the other hand, the facial nerve and the temporo-maxillary vein may properly be said to pierce it.

The term "facial process" may conveniently be applied to the thin, flat, and somewhat triangular portion of the gland which runs forward over the masseter.

The middle third or two-fourths of Stenson's duct lies almost in a transverse plane.   It pierces the "sucking pad" on its way to the buccinator.   Both Stenson's and Wharton's ducts are very much narrower at their orifices than in the rest of their course ; they may consequently be looked upon as forming something in the nature of reservoirs for the saliva.

Sub-lingual Gland.—In fourteen dissections made specially with this object, I failed to find any of the ducts of this gland opening into Wharton's duct as usually

described, nor have I found any duct corresponding to the ductus major of Bartholin. Indeed, I have never seen this duct (that is a large duct running with the terminal part of Wharton's duct, and opening along with or beside it) but once in the human subject.

The Apical Glands of Nuhn or Blandin (glandula lingualis anterior) are not exposed by merely removing the mucous membrane from the under surface of the tongue; in addition a layer of muscle about 1 or 2 mm. in thickness, made up of fibres derived from the united stylo-glossus and inferior lingualis, must also be reflected. The glands are mixed serous and mucous. They are often much broken up by the passage of muscular fibres amongst their lobules, and they measure from one-half to three-quarters of an inch in length (12-19 mm.).

THE TONGUE.

In connection with the tongue the terms "root" and "base" are often carelessly used, and by some the two are employed as if they were synonymous. It would be an advantage to restrict the use of the term *base* to the wide posterior part of the dorsum which is attached to the hyoid bone, and the term *root* to the portion attached by muscles, etc., to the hyoid bone and mandible.

THE PALATE.

The palatine glands, which are so abundant in the soft palate, are numerous also in the posterior half or more of the hard palate. Here they extend further forwards on each side (almost to the anterior third) than in the middle line, and they gradually cease along a curved line, arching outwards and backwards on each side from the raphé. In the child at birth the raphé, or rather the incisive pad at the anterior end of the raphé, is continued

forward over the upper gum into the frenum of the upper lip.

The anterior part of the soft palate, for about 8 or 10 mm., contains practically no muscular fibres; it is made up of the thin palatine aponeurosis, covered on the inferior surface by an extremely thick layer of mucous glands, and on both surfaces by mucous membrane.   This anterior part is much less movable than the posterior part; it forms a relatively horizontal continuation backwards of the hard palate, and upon it chiefly the tensor palati acts.   The crest on the posterior part of the under surface of the palate bone, to which the tensor palati is described as being attached, would seem to be developed rather as a protecting ledge to save the posterior palatine artery—which lies more or less under cover of it—from pressure.

THE PHARYNX.

I was anxious to devise some dissections of the pharynx from hardened bodies, which would give a better view of that cavity than the ordinary mesial and transverse sections.   Two very satisfactory specimens were the result. The first was made as follows:—The head and neck having been removed from the trunk of a hardened subject, a knife was introduced into the lower part of the œsophagus, whence it was carried transversely outwards, first on one side, then on the other, cutting through everything until the skin was reached and divided.   Then the knife was again introduced higher up, and the same process repeated until the base of the skull was reached, when the skull was divided transversely with a fine saw, and the anterior half of the head and neck with the anterior wall of the pharynx, on the one hand, was separated from the posterior half with the posterior wall on the other.   On the front half an excellent view of the anterior pharyngeal

wall, etc., was obtained. The posterior half showed merely the flattened posterior wall of the pharynx, with the pharyngeal tonsil. The section gives a very striking demonstration of the naso-pharynx, the soft palate, the isthmus of the fauces, and also of the flattening of the pharyngeal cavity from before backwards.

The second specimen was designed to show the naso-pharynx and the oral-pharynx from the front. The skull-cap and brain having been removed, and the opening of the mouth continued backwards on each side by an incision carried as far as the masseter, a coronal section was made through the anterior part of the head and face, which ran parallel to, and about 2 mm. in front of, the posterior edge of the nasal septum, and divided the back part of the hard palate transversely. The posterior edge of the nasal septum was preserved intact, and the posterior extremity of the two inferior turbinals also remained at each side. At the same time the oral pharynx and its surroundings were brought into view by depressing the tongue and mandible. In one specimen prepared in this way the posterior nares were particularly wide and the naso-pharynx especially roomy, so that a wonderfully distinct view of the naso-pharyngeal cavity, with its sloping vault and its Eustachian orifices, was obtained.

The flattening of the pharynx from before backwards, so distinct in hardened bodies, has been already referred to; at the same time the chamber-like character of the naso-pharynx is very distinct. A very striking characteristic of the pharynx is well shown in the first of the two specimens referred to above—namely, the great width of the naso-pharynx just behind the Eustachian tubes at the lateral recesses (fossæ of Rosemüller). Here the cavity bulges out on each side over the upper border of the superior constrictor for a considerable distance, and here, too, contrary to

the usual description, the pharyngeal cavity is widest. Next in width comes the oral portion of the tube, which is wider above than opposite the hyoid bone.

No convenient term is in general use for the aperture between the two posterior palatine arches through which the naso-pharynx above communicates with the oral-pharynx below. For this opening the name *pharyngeal isthmus* (isthmus pharyngonasalis of Luschka) is suggested.

There is practically no part of the constrictors in the wall of the naso-pharynx. The pharyngeal spine lies not on the roof, but low down on the posterior wall of the naso-pharynx; hence the upper border of the superior constrictor lies just above the level of the pharyngeal isthmus, for which it forms (with the palato-pharyngeus) a kind of sphincter.

The supra-tonsillar fossa is usually distinct as a variably developed depression just above the tonsil. The plica triangularis (His)—a thin triangular fold of mucous membrane, with its base towards the tongue, which projects backwards from the anterior palatine arch over the tonsil, to which it is generally united in the adult—is rarely well-marked in the adult or aged body, although so distinct in the child. The crypts of the tonsil communicate freely with one another within its substance (as pointed out by Paterson and others).

External Relations of the Tonsil.—The outer surface of the tonsil is enclosed by a distinct fibrous capsule connected with the pharyngeal aponeurosis, outside which lies the superior constrictor. This latter separates the tonsil in its upper three-fourths from the styloglossus, and in its lower fourth from the stylopharyngeus, with the glosso-pharyngeal nerve winding forwards over its upper border, on its way to the base of the tongue. The ascending palatine artery running upwards and backwards between the stylo-

glossus and stylopharyngeus and the tonsillar artery
(often a branch of the last) lie in close relation to the
outside of the tonsil, separated only by the superior con-
strictor.   The internal carotid, as usually described, lies
$\frac{3}{4}$ to 1 inch behind and to the outer side of the tonsil.

THE ŒSOPHAGUS.

Both a diaphragmatic (Jonnesco) and an abdominal part
of the œsophagus have been described. The diaphragmatic
portion, said to be about half an inch in length (1-1˙5 cm.)
corresponds to the portion of the tube which lies in the
œsophageal orifice (or canal) of the diaphragm. The long
axis of this orifice is very oblique, or almost vertical, and its
abdominal opening looks forwards and to the left but only
slightly downwards.   About, and in front, where it is
bounded either by the posterior edge of the central tendon,
or by a few decussating fibres of the muscular portion which
meet behind the tendon, the œsophageal orifice has practi-
cally no length, and, consequently, the œsophagus here
passes into the abdominal cavity immediately after leaving
the thorax. At the sides and below, on the other hand, the
decussating bands from the two crura which embrace the
orifice are so arranged that they turn a flat surface, not
an edge, towards the opening, and thus behind, and at
the sides, the orifice or canal is of some length,
and on these aspects there is a portion of the tube in con-
tact with the diaphragm for a distance of 1 to $1\frac{1}{2}$cm. But
this contact takes place, not around a horizontal line, but
in a very oblique plane, corresponding to that of the
orifice.   On the whole, it is, perhaps, more satisfactory
not to describe a separate diaphragmatic portion, but to
say that the œsophagus pierces the diaphragm very obli-
quely, and that at the sides and behind it is in contact
with the walls of the orifice for a distance of half an inch
or more.

The œsophagus in passing through the orifice is connected to its boundaries by a considerable amount of strong connective tissue, but it is extremely difficult, or impossible, to demonstrate any direct naked-eye connection between the œsophageal muscular fibres and those of the diaphragm.

The anterior or right boundary of the œsophageal orifice, formed of fibres derived from both crura of the diaphragm, is very strongly developed and prominent, and usually lies in the œsophageal groove, on the back of the left lobe of the liver, which groove is rarely due, I believe, to the pressure of the œsophagus itself.

The Abdominal Portion of the Œsophagus is very short, for, immediately after piercing the diaphragm, the tube expands into the stomach.   However, when the empty stomach is drawn forcibly downwards, a portion of the front and left side of the tube, about half an inch in length (1-1·5 cm.) is seen, to which the above term is applied.   This part is covered with peritoneum, derived from the great sac, in front and on the left, whilst its right and posterior surfaces are uncovered.   It is generally described as lying against the œsophageal groove, and the left lateral ligament of the liver in front, but it never actually comes in contact with the latter of these structures, which is attached to the upper surface of the left lobe of the liver by one edge, and to the diaphragm over an inch in front of the œsophagus by the other.   As regards the former, the œsophageal groove of the liver is generally occupied by the prominent right margin of the œsophageal orifice in the diaphragm, which possibly is so strongly developed and so prominent, in order to bear the pressure of the liver off the tube, which otherwise would be interfered with in its dilatation during the passage of food. When the stomach is distended this abdominal part of

the œsophagus practically disappears, being absorbed, as it
were, into the stomach in its enlargement. Or, possibly,
indeed, it is in most cases an artificial production due to
the traction on the empty stomach (generally necessary to
demonstrate it) pulling a part of the œsophagus from its lax
diaphragmatic moorings down into the abdominal cavity.

THE ABDOMEN.

Sub-divisions of the Abdominal Cavity.—It seems to me
that the lines adopted by Cunningham for the sub-division
of the abdominal cavity, with the exception of the mid-
Poupart line, are the most satisfactory. The mid-Poupart
line gives a lateral region, which is, particularly in the
female, entirely too narrow. A much more satisfactory
division of the mesial from the lateral portion of the
abdomen can be made by a "Poupart line," drawn verti-
cally upwards from a point on Poupart's ligament half
way between the anterior superior spine of the ilium and
the symphysis pubis. This gives a lumbar region of
nearly the same width as the right or left half of the um-
bilical region.

THE STOMACH.

The Natural Form of the Stomach.—As seen in male
bodies, the viscera of which have been hardened by the
intravascular injection of formalin, *the empty stomach* is
of an attenuated or slender pear shape, generally flattened
from above downwards, but preserving in its whole length
more or less of an irregularly rounded or cylindrical form.
In this, the empty, condition it is much bent on itself,
particularly at the junction of the cardiac and pyloric
portions, where the lesser curvature is generally reduced
to a sharp angle. The long axis of the organ (tracing it
from the summit of the fundus) is in the cardiac portion,
directed from behind forwards and to the right, with a

slight inclination downwards; then it bends almost at a right angle, and in the pyloric portion runs to the right towards the pylorus. Even in the empty condition the cardiac portion retains, as a rule, an appearance of rotundity, and rarely or never assumes a completely collapsed and flattened form; whilst the pyloric portion, contracting, assumes a narrow cylindrical shape, and resembles in size and general appearance a bit of thick-walled small intestine.

It would appear that the collapsed, flat-walled, and flaccid bag, usually pictured as the empty stomach, does not represent its true condition, but is rather the result of *post-mortem* softening, relaxation, and pressure. The stomach, like the bladder, and like other hollow viscera with muscular walls, is an extensile organ capable of considerable expansion, and also of contraction, in virtue of the properties of its muscular coat. When food enters its cavity it expands, the expansion being proportionate to the amount of food that enters; when the food passes away or is absorbed it contracts until its cavity is reduced to little more than a stellate lumen, containing, perhaps, some mucous, gastric juice, or gas. In other words, the stomach is not an inert bag hanging down when empty, like a flapping sail, with its walls in contact, but an active, living organ, capable of expansion and contraction, which adapts the size of its cavity to the amount of its contents.

Whilst all the other coats of the stomach are highly extensile, the mucous coat is so only to a slight degree; this coat must, therefore, be sufficient in amount to surround the cavity when largest; hence, when the stomach is empty, and the other coats contracted round the diminished lumen, the inelastic mucous coat is thrown into folds or rugæ, which project into and practically fill the cavity of the organ, and give to it, even in the empty condition, a rounded or cylindrical form.

The Distended Stomach.—In the gradual passage of the stomach from the empty to the distended condition we may recognise three stages. *First stage*—This commences with an enlargement of the fundus in a backward direction, and is followed by an expansion of the cardiac portion, which passes upwards towards the left cupola of the diaphragm and also to the left, displacing the coils of the transverse colon, which lie over the stomach and to its left when the organ is empty. The pyloric portion for 3 or 4 inches remains contracted and cylindrical, the whole organ bearing some resemblance to a Florence flask, sharply bent at the junction of the neck with the body, and in this condition the stomach is frequently found after death. *Second stage*—As distension goes on the lesser curvature opens out, the pyloric portion (with the exception of its last inch) becomes distended, but its junction with the cardiac portion is, as a rule, still marked by a faint constriction most evident at the curvatures, which persists until distension is almost complete. *Third stage*— A further general expansion of the whole stomach takes place ; the diameters of both cardiac and pyloric portions, as well as the length of the organ, are increased ; the great curvature presses forwards against the anterior abdominal wall in front, where the restraining influence of the ribs is absent. The pyloric end for about 1 inch (2·5 cm.) from the pylorus remains narrow (constituting the pyloric canal of Jonnesco), but to the left of this it is dilated, forming the antrum pylori, which is most distinct at the great curvature. By the increase in length of the organ the antrum is carried a considerable distance to the right beneath the liver—even further than the pylorus itself—so that the terminal part of the stomach is directed backwards in order to reach the pylorus, which latter rarely passes more than 2 inches to the right from its normal

position—namely, in the empty condition, within half an inch (12 mm.) of the middle line. And finally, as the stomach becomes distended, it gradually becomes more oblique, so that in the distended condition the long axis of the posterior two-thirds of the organ is directed forwards, downwards, and to the right, and it forms an angle of about 40 to 45 with both the horizontal and sagittal planes. This obliquity is due to the ascent of the fundus and adjacent parts of the upper surface into the cupola of the diaphragm during distension, and the descent of the under surface as it passes forwards towards the yielding anterior abdominal wall, where it is supported only by intestines.

There is, however, as pointed out by Jonnesco, no distinct rotation of the organ on its long axis, no turning of the great curvature more forwards, nor of the so-called anterior surface more upwards.

In the change from the distended to the empty state these stages are reversed; the whole stomach is contracted or drawn in from all directions towards the lesser curvature; this latter is bent upon itself to an acute angle, and the long axis of the organ becoming less oblique approaches the horizontal.

Although this description of the shape and direction of the stomach is at variance with the generally accepted accounts, it is based upon the examination of a considerable number of hardened bodies, and has been found to apply so generally in well formed males that it is advanced here as the condition most frequently found during life or immediately after death.

In connection with the usual description—viz., that the cardiac two-thirds or three-fourths of the stomach is placed vertically—it may be pointed out that the antero-posterior depth of the portion of the abdominal cavity in which this

part of the stomach lies is often over 5 or even 6 inches, and
this with a stomach the greatest diameter of which is 4
or $4\frac{1}{2}$ inches. Again, with the arrangement of the pan-
creas and transverse mesocolon, which is found to exist in
hardened specimens, and which will be described in con-
nection with the stomach bed, it is impossible for the
cardiac portion of the stomach to lie vertically without dis-
placement of the pancreas and other parts. It must, how-
ever, be admitted that in the female, as a result of tight
lacing, the stomach is often found to assume an abnormal
and almost vertical position, but this condition is associa-
ted with displacement of other abdominal organs in the
neighbourhood.

It should, perhaps, be mentioned in this connection that
the posterior part of the under surface of the stomach
as far forwards, namely, as the anterior edge of the pan-
creas, is nearer to the horizontal than the portion in front
of it. This is due to the firm support which the kidney
and pancreas afford to the former part. Indeed, there is
often a distinct bend in this surface, corresponding to the
anterior edge of the pancreas.

In brief, it may be said that the stomach when empty is
contracted, not collapsed; that it assumes a narrow at-
tenuated shape, its cavity being practically obliterated,
and its pyloric portion contracted to the size of small in-
testine; and, in addition, that its long axis lies in an almost
horizontal plane. With distension there comes a general
enlargement of the various diameters, an elongation of
the whole stomach, with a consequent passage of its pyloric
portion to the right beneath the liver, the development
of the antrum pylori, and a general inclination of the
organ from behind downwards and forwards without any
rotation.

Surfaces.—There is little doubt, considering the position

of the empty stomach, that its two surfaces should be called superior and inferior, rather than anterior and posterior, respectively.   The superior is the more convex and the more extensive of the two.

If the attachment of the lesser omentum be traced towards the cardia, it will be found to wind gradually on to the upper surface, so that the œsophagus joins the stomach rather on its upper surface than at the lesser curvature (as I pointed out in a former paper[a]).

The Stomach Chamber and Stomach Bed.—These I have already described in a former communication.   The following description may be given after a more extended study of the hardened body :—

The portion of the abdominal cavity in which the stomach lies has such definite boundaries and such constant surroundings that it seems to merit the title of "stomach chamber," particularly as the boundaries or walls of the space— which is completely filled by the distended stomach—do not collapse when the stomach is empty, but maintain the form of the cavity, which then—as a rule—becomes occupied by the transverse colon, which doubles up over the stomach when this latter is empty.   The chamber presents an arched roof, an irregular sloping floor, and an anterior wall.

The roof is formed on the right by the visceral surface of the left lobe of the liver, and in the rest of its extent by the left cupola of the diaphragm, which arches gradually downwards behind and on the left to meet the floor.

The floor, or *"stomach bed,"* is a distinct sloping shelf, not a mere indiscriminate collection of underlying viscera, but a definite bed, constant in its formation, on which the under surface of the stomach rests, and by which the organ

[a] Journal of Anatomy and Physiology.   October, 1896.

is supported.   The bed is formed behind by the top of the
left kidney (with its suprarenal capsule) and the gastric sur-
face of the spleen, both of which taken together constitute
a fairly regular concave surface sloping backwards and up-
wards to meet the roof, and thus completing the posterior
part of the chamber which receives the fundus of the
stomach.   In front of the spleen and kidney the bed is
formed, first by the wide upper surface of the pancreas,
then by the transverse mesocolon sloping forwards and
slightly downwards from the anterior edge of the pancreas
to the colon, which latter completes the floor anteriorly.
This portion of the transverse mesocolon, on which the
stomach rests, is stretched over and buoyed up by a large
mass of small intestine (jejunum), which invariably will
be found packed in beneath the mesocolon on the front of
the left kidney, when the transverse colon is turned up.

Finally, the anterior wall of the stomach chamber is
formed by the abdominal wall between the ribs on its left
and the liver on its right side.

Behind, as already indicated, the chamber is com-
pleted by the meeting of the floor and roof, but the
line along which the two meet is variable ; for sometimes
the spleen extends up but a little way at the back of the
chamber, whilst in other cases it constitutes the greater
part of its posterior boundary and forms a cup-like surface
on which the inferior aspect of the fundus of the stomach
rests.

This chamber, as already mentioned, is completely filled
by the stomach when that organ is distended.   When, on
the other hand, the stomach is empty and contracted,
it still rests on the floor, or stomach bed, but occupies only
the lower portion of the chamber, whilst the rest of this
space is filled by the transverse colon, which turns gradually
upwards as the stomach retracts, and finally comes to

lie both above and in front of that organ, and immediately beneath the diaphragm—a fact of some importance in clinical examination of this region. Possibly one of the reasons why the transverse colon is so tortuous, and its mesentery so long, is to permit of this doubling up in the manner described in order to fill the space vacated by the contracted stomach. Sometimes part of the small intestine too may be found in the chamber.

The Pyloric Portion of the Stomach and the Antrum Pylori.—When the stomach is empty the pyloric portion, for a distance of 3 or 4 inches, is contracted and cylindrical; it resembles in appearance a bit of thick-walled small intestine, and runs transversely to the right, lying, as a rule, beneath the left lobe of the liver. When the stomach is distended this part is carried to the right beneath the quadrate lobe, and its terminal part is directed backwards, or even backwards and to the left, to reach the duodenum; at the same time it becomes curved like an italic *S* placed horizontally. This *S*-shaped curve (which is maintained by the ligamenta pylori) gives rise to two grooves, one at the upper, the other at the lower border and nearer to the pylorus. The first curve of the *S*—i.e., that nearest to the cardiac end—is convex downwards and forwards, and this becoming more prominent with distension forms the antrum pylori. The terminal curve of the *S* extends up to the pylorus; it is nearly one inch in length, and it appears never to become dilated to any noticeable extent. This is the part described by Jonnesco as the pyloric canal.

When examined *post mortem* in the ordinary way the pyloric aperture, viewed from the duodenal side, is somewhat oval in form, and closely resembles the external os uteri, as pointed out by Cunningham. From the opposite side it presents an irregular or stellate appearance, owing to the rugæ of the gastric mucous membrane being con-

tinued up to the orifice.   In formalin-hardened bodies with
empty and contracted stomach and duodenum, the aperture
is closed, and presents a stellate or purse-mouth appearance
when viewed from either side, the appearance of firm
closure being much more marked on the gastric than the
duodenal aspect.   In hardened bodies with distended
stomach and duodenum 'the aperture, which is somewhat
oval, is practically closed, and from the duodenal side
resembles the os uteri.   But both in the empty and dis-
tended state the pylorus seems to be a tubular narrowing
extending over half an inch to an inch of the canal, rather
than an abrupt constriction.   On section it will also be
remarked that the muscular thickening which produces
the valve is gradual in its development when traced from
the gastric side, but that it ends abruptly as the duodenum
is reached.

When the stomach is empty the pylorus lies about 2
inches below, $1\frac{1}{2}$ inches to the right, and the same dis-
tance in front of the cardia; in the distended condition its
position is about $2\frac{1}{2}$ or 3 inches below, 2 to $2\frac{1}{2}$ inches to the
right, and 2 inches in front of the cardia.

I have never seen a really patent pylorus in a hardened
body with either an empty or a distended stomach, which
leads me to think that in its ordinary condition the pylorus
is naturally closed, and that the opening of the orifice (like
that of the anus) is an active process.

The "uncovered area"—that is to say, the small tri-
angular surface of the stomach which is free from peri-
toneum—is situated on the inferior (or posterior) surface,
below and to the left of the cardia.   It is irregularly tri-
angular in shape, and measures about 2 inches in width,
and $1\frac{1}{2}$ inches from above downwards.   From its left angle
the attachment of the great omentum (gastro-splenic part)
starts, and at its right angle the coronary artery reaches
the stomach.

Often patches of *valvulæ conniventes*, much reduced in size, can be traced to within a short distance of the ileo-cæcal valve. According to Sappey, Luschka, and others, they usually reach to within 2 or 3 feet of the large intestine.

When the surface of the *Peyer's patch* from a child's intestine (in which these structures are particularly well-developed) is carefully examined, it is seen to be made up, not of a series of separate rounded nodules grouped together, but rather of a number of wavy, irregular and branching ridges connected with one another by cross branches, the whole recalling in miniature the appearance of a raised map of a very mountainous district in which the chief chains run irregular courses and are joined to one another by connecting ridges.

Brunner's Glands form an almost continuous layer of little rounded or flattened masses (of a reddish-grey colour, varying in size from one-fiftieth to one-twelfth of an inch in diameter) in the sub-mucosa of the duodenum as far as the opening of the bile duct; beyond this they can however be easily traced, diminishing progressively, and they disappear altogether near the duodeno-jejunal flexure.

The Mesentery rarely measures more than 6 inches from its posterior attachment to the intestine directly opposite. Treves and Lockwood give the length of the mesentery as 8 or 9 inches; this measurement must, I imagine, have been taken obliquely, perhaps from the upper part of the posterior to the lower part of the intestinal attachment.

Whilst the root of the mesentery pursues at its attachment an almost straight line from one end to the other, if cut across a very short distance from the abdominal wall it will be found to form here a wavy or undulating line. Further out still this becomes more and more marked, and

finally, if the bowel be removed by cutting through the
mesentery close to its attachment to the intestinal wall, it
will be seen that its free edge is not only undulating but
is frilled or plaited to an extreme degree.   When shown
in this way it is found that the plaiting or folding is not
quite indiscriminate, but that the main folds, of which
there are usually six, run alternately to the right and
left.   As a rule, the first fold runs to the left from the
duodeno-jejunal flexure, and goes to a coil of jejunum
which lies under the transverse mesocolon, and helps to
support the stomach. (This coil has been already referred
to p. 461.)   The second fold passes to the right, the third
to the left, and so on up to the fifth and sixth, which are
usually small.   From the margins of these primary folds
secondary folds project in all directions, and from these
again even a third series may be formed.

This order is, of course, by no means constant, but if the
intestine be removed from a hardened body in the way sug-
gested, without disturbing the mesentery, it will be found
to be arranged with more or less regularity on some such
plan as that indicated.

Meckel's Diverticulum Ilei.—I have incidentally looked
into the literature of Meckel's diverticulum, and it may be
of interest to give some of the results, for which I am chiefly
indebted to the Collective Investigation of the Anatomical
Society of Great Britain and Ireland, and to the papers
of L. J. Mitchell, Kelynack, Rogie, and Augier. *Fre-
quency*—In 3,302 bodies specially examined with reference
to its existence, it was present in 73, or 2·2 per cent., and
it appears to be more common in the male than in the
female.   *Position*—In 59 cases its position with reference
to the end of the ileum was examined, and its average dis-
tance from the ileo-cæcal valve was $32\frac{1}{2}$ inches measured
along the gut, the greatest distance being 12 feet, and the

smallest 6 inches.   *Length of the diverticulum*—The average
of 52 specimens was 2·1 inches, the longest being 5¼ inches,
the shortest half an inch.   The *diameter* usually equals
that of the intestine from which it springs; occasionally it
is cord-like and pervious only for a short way; on the
other hand, it has attained a diameter of 3¾ inches.

LARGE INTESTINE.

In formalin-hardened bodies portions of the large intes-
tine, but particularly the descending and sigmoid colons,
are, when empty, generally reduced to a diameter of about
five-eighths or three-quarters of an inch. Under similar
conditions the other parts of the colon are correspondingly
reduced.

The Appendices Epiploicæ, although generally said to
be absent in the fœtus, can be distinctly seen as early as
the seventh month; at this date, however, they contain no
fat.

Tæniæ Coli.—The position of the three tæniæ on the
intestine is as follows:—On the ascending, descending, and
iliac colons one tænia lies on the anterior aspect of the
gut, and two behind, one to the outer (postero-external), the
other to the inner side (postero-internal). The tænia in
any one of these positions on the ascending colon occupies
the corresponding position on the descending and iliac
colons.   On the transverse colon their arrangement is
different, but is rendered exactly similar by turning the
great omentum with the colon up over the thorax. It is
chiefly along the first of these (the anterior) that the appen-
dices epiploicæ are found. On the transverse colon, in the
natural position, the anterior tænia of the ascending and de-
scending colons becomes the posterior (or posterior-inferior,
tænia libra), the postero-external becomes the anterior (or
omental), and the postero-internal the superior (or meso-

colic). The anterior and postero-external tænia of the iliac colon pass below on to the front of the pelvic colon and rectum.

Cæcum.—The ileo-cæcal orifice is generally placed on the posterior part of the inner aspect of the cæcum; about 1 to 1½ inches lower down is seen the opening of the vermiform appendix.

When hardened *in situ* with formalin the valve and orifice present an appearance entirely different from that seen in the dried and distended specimens, and suggest much more closely than in the dried state an appearance of telescoping of the small into the large bowel. The two segments of the valve are also much thicker and shorter, but they can always be made out, when they are found to bear the same relation to one another as in the dried condition, although this may be obscured by foldings or rugæ. The aperture may be slit-like or rounded, with sloping or infundibuliform edges; the frenula are not so prominent at times, but the whole valve projects much more abruptly into the cavity of the cæcum than in the distended and dried specimen.

The upper segment in dried specimens usually projects into the cavity of the cæcum more than the lower, so that the aperture appears to be placed between the *edge* of the lower segment and the *under surface* of the upper.

There is little doubt, as pointed out by Symington, that the efficiency of the ileo-cæcal valve is largely due to the oblique manner in which the ileum enters or "invaginates" the cæcum; this oblique passage alone, as in the case of the ureter piercing the wall of the bladder, would probably be sufficient to prevent a return of the cæcal contents. In the great majority of cases, when in position within the body, the ileum is perfectly protected from such a return, although when the parts are removed and distended with

fluid this often passes through the valve and reaches the small intestine. Still the value of such a test, applied when the parts are deprived of their natural support, cannot be relied upon.

The position of the ileo-cæcal orifice can be indicated on the surface, as a rule, by the point of intersection of the intertubercular and Poupart (not mid-Poupart) lines. A point 1 to 1½ inches lower would indicate the orifice of the appendix.

Development of Cæcum and Vermiform Appendix.—The cæcum first appears in the embryo at about the fifth week (His) as a small outgrowth of the wall of the primitive gut (mid-gut) not yet differentiated into small and large intestines. At this time the outgrowth is of the same size throughout, and is practically equal to the intestines in diameter. I have examined a number of older embryos with the following results:—About the eleventh week, whilst the two divisions of the gut are still of the same diameter, it has increased very considerably in length (this latter being equal to about five times the diameter of the intestine, and thus being relatively as long as in the adult), but even at this early date the basal portion for about one-fifth of its length is quite as wide as the intestine, whilst the remaining four-fifths of the outgrowth—the future appendix—is only about one-half or one-third the diameter of the gut. From this it is seen that, even at the tenth or eleventh week of fœtal life, the distal portion of the outgrowth, which subsequently becomes the vermiform process, is beginning to lag behind in its development.

The basal portion continues to expand with the gut; the distal part grows rapidly in length, but otherwise enlarges very slowly, so that towards the end of fœtal life the cæcum has attained a conical shape, the wider end joining the ascending colon, the narrow end tapering gradually and

passing into the vermiform process. This form, known as the infantile type of cæcum, is retained for some time after birth, or even may (in two or three per cent. of cases) persist throughout life. As early as the sixth or seventh month of fœtal life, the wall of the terminal portion of the small intestine adheres to the inner side of the cæcum for some distance below the ileo-cæcal orifice; indeed, for the greater part of its length. And this connection, which is rendered more intimate by the passage of two folds of peritoneum, one on the front, the other on the back, between the two parts, profoundly modifies the subsequent growth of the cæcum and determines very largely its adult form. For, when the cæcum begins to expand, the inner aspect is prevented by its connection with the termination of the ileum from enlarging as freely as the rest of the wall; in consequence of this the outer part grows and expands much more rapidly, producing the characteristic lop-sided appearance of the organ, and soon comes to form the lowest part or fundus of the cæcum, and the greater part of its sac. Whilst the original apex, with the vermiform appendix springing from it, anchored, as it were, to the end of the ileum, is thrust to one side and finally lies on the inner or inner and posterior aspect of the cæcum, a little way below, and usually posterior to, the end of the ileum.

Although the opening of the appendix is usually between 1 and 1½ inches below the ileo-cæcal orifice when seen from the interior, viewed from the exterior the appendix comes off from the inner and posterior aspect of the cæcum about three-quarters of an inch below the inferior margin of the ileo-cæcal junction. The readiest guide to the appendix is the anterior tænia coli, which is always distinct.

My experience agrees with that of Berry as regards the mesentery of the appendix, which usually extends to

the tip of the process, and connects this latter to the under surface of that part of the mesentery proper which goes to the lower end of the ileum.

The *Appendix* is stated to be relative to the rest of the large intestine, much longer in the child at birth than in the adult. Ribbert makes the proportions 1 to 10 at birth, and 1 to 20 in the adult. This difference is, I believe, excessive; the proportion in my experience has been as 1 to 16 or 17 at birth, and 1 to 19 or 20 in the adult.

Structure of the Appendix.—The submucosa, which is thick, is almost entirely occupied by large masses of lymphoid tissue surrounded by sinus-like lymph spaces. Owing to the large size of these lymphoid nodules the areolar tissue of the submucosa is compressed against the inner surface of the muscular coat, and forms a well-marked fibrous ring, which sends processes at intervals between the lymphoid masses towards the mucous membrane. The inner portion of this fibrous ring seems to have been mistaken for the muscularis mucosæ, which lies internal to the chief masses of lymphoid tissue, and not outside it as figured by Testut. These lymphoid nodules, which correspond to solitary glands, have, owing to their great number, been almost completely crushed out of the mucosa (in which they chiefly lie in the intestine) into the submucosa. Some few lymphoid nodules lie in the mucosa also.

The blood-vessels of the cæcum and appendix I have found to agree with Jonnesco's description. I have never been able to trace a branch from the ovarian artery to the appendix in the female.

Transverse Colon.—The state of the peritoneal covering on the first part of the posterior surface of the transverse colon would seem to depend, in some degree, on the extent to which the liver passes downwards on the right side.

With a small high liver no mesentery is present; on the other hand, when the liver is enlarged in the vertical direction, it pushes the colon downwards before it, and brings the upper line of the peritoneal reflection from its back into contact with the lower, thus giving rise to a mesentery.

I can corroborate Jonnesco's statement that the phreno-colic ligament is developed from the left margin of the great omentum. The peritoneum of the splenic flexure is similar to that of the descending colon.

Sigmoid Flexure and Rectum.—It has been customary to divide the portion of the large intestine beyond the descending colon into sigmoid flexure and rectum. Treves, in 1885, and Jonnesco, in 1889, directed attention to the fact that no such loop as the classical sigmoid flexure lying in the iliac fossa was to be found in nature, and also that the separation of the first portion of the rectum from the sigmoid flexure—so-called—was both artificial and inaccurate. They pointed out that the "first part of the rectum" really belongs to the sigmoid flexure, with which it has everything in common, and that on no grounds can it be properly assigned to the rectum.

An unbiased study of the parts concerned, particularly in bodies the viscera of which have been hardened *in situ*, will leave little doubt, I believe, that the old descriptions are not only artificial but erroneous, and that the admirable account of this part of the intestine given by Jonnesco is very much more satisfactory.

Jonnesco, recognising that this portion of the intestine lies partly in the iliac fossa and partly in the pelvis, very appropriately calls the former portion the *iliac colon*, and the latter the *pelvic colon*. The iliac colon includes the portion of the "sigmoid flexure" which extends from the crest of the ilium to the inner side of the psoas muscle (that is, to the brim of the pelvis), and is usually destitute of a mesentery.

The pelvic colon embraces the remainder of the sigmoid colon and the "first part of the rectum," both of which are attached by a continuous mesentery, and form one large loop, lying, as a rule, in the pelvic cavity, and ending about the level of the third sacral vertebra by passing into the rectum proper, which is destitute of a mesentery.   The division is a natural one, for, as Jonnesco points out, the pelvic colon forms a free loop with a long mesentery, whilst the part that precedes it (the iliac colon) and the part which succeeds it (the rectum) are fixed and devoid of a mesentery.

The pelvic colon, beginning at the inner edge of the psoas, plunges over the brim into the pelvic cavity, on the floor of which it runs, as a rule, to the right and backwards, resting on the upper surface of the bladder ; having reached the back of the pelvis it turns to the left towards the middle line, where it bends down—forming a recto-colic flexure—and passes into the rectum.

The loop of the pelvic colon is subject to numerous and considerable variations, which are chiefly dependent upon its length and that of its mesentery, and the state of emptiness or distension of itself and the other pelvic viscera. When the intestine is long, the loop is more complex ; when short, more simple.   When the bladder and rectum are distended, or when the pelvic colon itself is much distended, it is unable to find accommodation in the true pelvis, and, consequently, it turns up into the abdominal cavity, almost any part of the lower half of which it may occupy.   But in the great majority of cases (92 per cent. according to Jonnesco) it is found after death lying entirely within the pelvic cavity.

As the tæniæ of the descending colon are followed down it will be found that the postero-external gradually passes on to the front, and unites with the

anterior tænia to form a broad band, which occupies nearly the whole width of the anterior aspect in the lower portion of the pelvic colon.   The postero-internal tænia spreads out in a similar manner on the back, so that in the lower half of this colon the longitudinal layer of the muscular coat is complete, with the exception of a narrow part on each side; here the circular fibres come to the surface, and the intestine presents a series of small sacculations.   These, however, disappear, and the longitudinal fibres form a continuous layer all around as the rectum proper is approached.

THE RECTUM.

The rectum, following Jonnesco's division, may be described as the comparatively dilated portion of the bowel between the pelvic colon above and the anal canal below. Normally it probably forms only a temporary reservoir in which the fæces accumulate a short time before defæcation takes place; as a result of habit, however, this temporary function may be converted into a more or less permanent one.

Although Jonnesco states that the rectum begins (that is, the pelvic mesocolon ends) most frequently opposite the disc between the third and fourth sacral vertebra, it has been my experience that the rectum commences more frequently above than below the third piece of the sacrum. It ends opposite the lower and back part of the prostate in the male—or at a point $1\frac{1}{2}$ inches in front of, but at a lower level than, the tip of the coccyx in both sexes—where the bowel bends abruptly downwards and backwards, and piercing the pelvic floor passes into the anal canal.   Its general direction is downwards, but at its upper end, following the curve of the rectum, it also slopes slightly backwards; its middle portion is practically vertical, but the

terminal third or more is directed downwards and forwards
at an angle varying from 45° to 60° with the horizontal.
The pelvic floor upon which it rests forms here a similar
angle with the horizontal.   The bend which the bowel
forms behind the lower end of the prostate where the
rectum passes into the anal canal is, as pointed out above,
abrupt and usually approaches a right angle, so that the
anal canal itself slopes downwards and backwards at an
angle, as a rule, of from 30° to 45° with the horizon-
tal.   Not uncommonly this latter curve represents a
knuckle-like projection, as seen on mesial section, imme-
diately above the anal canal. This is most marked in
females, and sometimes appears as if the anterior wall of
the bowel were doubled back upon itself at this point.   The
floor of the *cul-de-sac* thus formed may dip down in front
even below the level of the upper aperture of the anal
canal.   This condition is most common in multiparæ,
and is evidently due to the relaxed condition of the pelvic
structures, the slight support afforded by the perineal body
to this part of the gut, and the great capacity and shallow-
ness of the pelvis in these.

Although the sacculations which are so characteristic
of the large intestine cannot properly be said to exist
in the rectum, still it presents certain well-marked in-
flexions which have been described as lateral sacculations
(Otis).   The term "sacculations" should, I think, be
reserved for localised dilatations engaging a part only of
the wall of the gut.   If this is so it cannot properly be
applied to the condition found in the rectum, which really
presents a series of lateral flexures involving the whole
tube, including the longitudinal muscular fibres.   When
viewed from the front the rectum is seen to be regularly
folded from side to side in a zig-zag fashion, the folding
being slightly marked when the rectum is empty, but

becoming much more distinct with distension. In
other words, when viewed from the front this division
of the bowel presents, in the majority of cases, three more
or less distinct flexures. Of these the upper and lower
have their concavities directed to the left, as a rule; the
third flexure, which is the best marked of the three, lies
between the other two, but on the right side. Not infre-
quently, however, two flexures are on the right, and one
on the left. There are thus produced three lateral inflec-
tions of the tube as it passes from side to side, each of
which appears on the exterior as a transverse crease or
angle, whilst in the interior they project into the cavity
of the bowel as three prominent crescentic shelves,
known as the *rectal valves* (plicæ transversalis recti—valves
of Houston or Kohlrausch), which help to support the fæcal
contents when the rectum is distended.

The rectum in animals generally is free from these
bendings, and the condition found in man is evidently an
adaptation to the erect attitude. In quadrupeds the con-
tents of the rectum do not press unduly on the sphincter,
owing to the horizontal position of the body. With the
assumption of the erect attitude, on the other hand, the
whole weight of the contents would be thrown on the
sphincters were it not for the lateral foldings and the result-
ing shelves which break up the contained mass into seg-
ments, each supported by the corresponding rectal valve.

As pointed out by W. Otis, this folding—or alternate
sacculation of the sides, as he considers it to be—is main-
tained by the arrangement of the longitudinal muscular
fibres, the majority of which are accumulated in the form
of two wide bands, one on the front, the other on the back
of the bowel. At the same time it should be pointed out
that longitudinal fibres are found in abundance at the
sides also, where they dip into the angles formed by the

flexures, in this differing from the condition present in the sacculations of the colon.

Another purpose served by these foldings is to greatly increase the capacity of the rectum without unduly dilating the tube. When the rectum is empty its course is comparatively straight, its lateral flexures being but slightly marked, and its whole calibre very much reduced.   In this condition it occupies only a small portion of the posterior division of the pelvic cavity near the mesial plane. At each side, between it and the lateral wall of the pelvis, is a large fossa of the peritoneum (the "pararectal fossa") which, when the bowel is empty, contains a mass of small intestine or pelvic colon. When the rectum is distended the lateral flexures become much more marked, and, projecting alternately to each side, they pass out beneath the peritoneum, obliterating the pararectal fossa, and fill the greater part of the posterior division of the pelvis—a condition which could not be brought about with a straight rectum without an enormous increase in all the diameters of the tube.

In length the rectum proper measures about 5 or 6 inches. Its diameter—which is least above—is about 1 inch when the bowel is empty, but it may be as much as 3 inches in extreme distension.

It is of interest to notice that the connection of the peritoneum to the rectum varies in its different parts. Above and in front it is closely adherent and can be removed only with the greatest difficulty; at the sides and below the connection is much looser. As a result, the peritoneum can, without much difficulty, be stripped off the rectum in its lower third or half, whilst in its upper portion this is not the case.   This arrangement allows of the free expansion of the lower part of the bowel (rectal ampulla) without being in any way hampered by its partial peritoneal coat.

The seminal vesicles, unless when of small size, slope outwards and backwards around the front and sides of the rectum, which they thus embrace, as it were, within their grasp.

Structure of the Rectum.—The longitudinal muscular fibres, although present all round, are chiefly accumulated on the front and back of the tube, where they form two broad bands ; at the sides they form a thinner layer, and the deepest of them are folded in and take part in the formation of the rectal valves in the interior of the bowel. Where the rectum pierces the floor of the pelvis, this layer appears to be united to the deeper portion of the levator ani partly by tendinous fibres, and partly by an interchange of muscular fibres between the levator ani and the muscular coat of the rectum. (This interchange of fibres, however, is denied by Peter Thompson and Browning.)

The mucous membrane of the rectum presents to the naked eye a characteristic punctated appearance, which is due to the presence of a considerable number of large round pits, such as might be made by pressing a finely-pointed pencil firmly against the mucous membrane. I am not acquainted with any previous description of these pits, which are, I believe, constant features of the mucous membrane of the rectum. Each pit is lined by a continuation of the mucous membrane provided with obliquely placed Lieberkuhn's glands, and in the mucosa, at the bottom of the pit, is a mass of lymphoid tissue, the whole appearance being such as might be produced were a solitary gland pulled down from the surface into the substance of the intestinal wall.

ANAL CANAL.

The anal canal, so well described by Symington, results from the nipping in of the lower end of the bowel between

the mesial borders of the two levatores ani, as between the two limbs of a clamp. When the distended rectum is cut across near its lower end, and the anal canal examined from the interior in a hardened body, a distinct projection formed by the inner border of the levator ani (pubo-rectalis, or sphincter-recti portion) is seen on each side, indicating the upper limit of the canal. These ridges can also be felt during life by the finger introduced into the rectum (Cripps).

The columns of Morgagni, which are placed in the upper and part of the middle thirds of the anal canal are permanent folds, not effaceable ones as often described. I have found them present in the foetus of the third or fourth month, as are also the valves of Houston.

It is very difficult to say how much of the anal canal is formed from the proctodæal invagination. Ball's view that the anal valves are the remains of the anal membrane, and that all below them is proctodæal, has much to commend it. He bases this view largely on the fact that the anal valves have squamous epithelium on their under surface and columnar epithelium above. The character of the epithelium alone must not be considered conclusive, for the stomatodæum, at the opposite end of the intestinal canal, gives rise to the columnar epithelium of the nose. Besides, Jonnesco states that whilst the epithelium covering the grooves between the columns of Morgagni is columnar, that of the columns themselves is squamous.

Ball and others limit the term anal canal to the portion of the passage below the anal valves, on the ground that only so much is developed from the proctodæum. I think the division given originally by Symington is more satisfactory, for two reasons. In the first place, the term anal canal or passage is a purely physiological, not an embryological, one, and the correctness of its application does not depend on

the condition in the embryo; and, secondly, it has not yet been shown definitely how much of the canal is formed from the proctodæum.   Should it be proven that Ball's view is correct, then this part might be known as the proctodæal canal, or the proctodæal portion of the anal canal.   The term anal canal should be applied to the whole *canal* or *passage* leading from the rectal *cavity* to the surface.

ACTION OF THE LEVATOR ANI AND OF THE SPHINCTERS.

Levator Ani.—The fibres of the levator which arise from the pubes (pubo-coccygeus or sphincter recti portion) pass backwards on each side of the upper part of the anal canal, and in great part meet behind the passage.   These two muscular bands, which are quite close to one another at their origin, and are actually united behind the bowel, during the contraction of the muscles are more closely approximated like the limbs of a clamp, and, pressing on the sides of the anal canal, they assist in closing the upper part of that orifice, whilst at the same time drawing it slightly towards the pubes.   There is little doubt that this part of the levator ani, in this way, acts as one of the chief— if not the chief—sphincters of the bowel; and it should be noticed that it is placed where its action would be most effective—namely, opposite the point at which the rectum is narrowed or "pinched in" to form the anal canal.   It is probably relaxed during defæcation, except, perhaps, at the completion of the act.

The External Sphincter forms a muscular cylinder around the lower two-thirds of the anal canal, with (except in the case of some of its inner fibres) an anterior and a posterior attachment.   When the muscle contracts its fibres are tightly stretched between their anterior and posterior attachments, and the space between them is reduced to

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a narrow antero-posterior slit.   By this action the anal canal is flattened from side to side and closed, so that whilst the levator ani is the sphincter of the upper aperture of the anal canal, the external sphincter closes its lower and greater part.

The Internal Sphincter is continuous with the circular fibres of the gut, not only in structure but probably also in action, its chief use being to empty the anal canal completely after the passage of each fæcal mass.   Owing to the fact that the canal is an antero-posterior slit, not a circular orifice, and that the internal sphincter forms a muscular ring around it, acting alone, it is scarcely competent to keep the sides of the canal in apposition, and probably it acts rather as a detrusor than a true sphincter of the anal passage.

LIVER.

The large number of surfaces enumerated on this organ renders the description of the liver much more complicated, without, I think, in any way affording great counterbalancing advantages, particularly as the student is inclined to attribute an equal value to every surface.   I have sought for some natural method of combining or connecting these surfaces, and I have come to the conclusion that the liver may be most simply described as possessing two chief surfaces—namely, a *parietal*, convex in general outline, which fits into the vault of the diaphragm, and a *visceral* surface, irregular in form, which looks downwards, backwards, and to the left, and rests upon the abdominal viscera.   The former of these two surfaces—which may be taken as equivalent in value, but not in size—can be further sub-divided into superior, posterior, right and anterior areas, corresponding to the same named *surfaces* of Symington.

From a study of hardened specimens, it is seen that the mass of the right lobe lies chiefly in an antero-posterior direction, its thick posterior part fitting into the wide groove at the side of the vertebral column, and its long axis running from behind forward and a little inward. The left lobe, leading off from the anterior part of the right lobe, is folded across the front of the vertebral column and great vessels, its long axis running transversely, but it does not pass back at the side of the column like the right lobe, so that there is no real notch, as usually described, at the back of the liver for the vertebral column, but merely an angle formed by the meeting of the two lobes, coming from different directions. In other words, viewed from above the long axis of the two lobes meet almost at a right angle, the one running antero-posteriorly, the other transversely. The whole liver is bent or folded, as it were, around the longitudinal fissure, in such a way that a considerable portion of the free surface of the two lobes come in contact at the fissure. There is thus formed on the posterior and inferior surfaces a deep cleft (fully one inch in depth), at the bottom of which lie the remains of the umbilical vein and the ductus venosus.

The limits of the normal liver may be marked out on the surface of the body with sufficient accuracy for all ordinary purposes by the following method :—Three points are determined : (a) a half inch (12 mm.) below the right nipple, (b) an inch (25 mm.) below the left nipple, and (c) an inch (25 mm.) below the right margin of the thorax (or below the tip of the tenth rib). If the two "nipple points" a and b be joined by a line, slightly convex upwards on each side, but a little depressed at the centre, corresponding to the position of the heart, and crossing the sternum about the level of the sixth cartilage, this will mark the upper limit. A line concave inwards from

the right nipple point *a* to the sub-costal point *c* will indicate the right limit; and a line slightly convex downwards from the sub-costal point *c* to the left nipple point *b* will mark the lower limit.

The vertical grooves often found in front and on the right of the liver along the ridge which separates the anterior and right areas of the parietal surface from the superior area, are apparently due to a wrinkling or an irregular contraction of the diaphragm—at least ridges of the diaphragm are found lying in the grooves in hardened bodies, and they apparently give rise to them.

Spigelian Lobe.—The upper end of this lobe is separated from the superior area of the parietal surface by the meeting of the vena cava and the fissure of the ductus venosus in front of it.   Lower down the two do not meet, but they are separated only by a narrow portion of liver substance which connects the Spigelian to the right lobe.   In the hardened liver only the posterior surface of the Spigelian lobe is seen on the surface; its anterior surface is hidden by the folding of the left lobe across its front. There is thus formed a deep fissure, bounded behind by the anterior surface of the Spigelian lobe and in front by the adjacent part of the left lobe, at the bottom of which will be found the remains of the ductus venosus.   This anterior surface of the Spigelian lobe is easily displayed, when the liver is *in situ*, by tearing through the layers of the lesser omentum, and then dividing the lateral ligament and drawing the left lobe forwards.   When the ordinary soft liver of the dissecting room is removed, the left lobe falls away from this surface, the fissure of the ductus venosus opens out, and the Spigelian lobe becomes very much more prominent.

The œsophageal groove, as already pointed out, lies, as a rule, in contact with the prominent right or anterior

margins of the œsophageal orifice of the diaphragm—some-times, perhaps, with the œsophagus itself.

Portal Fissure.—When the liver is in the body, or when hardened before removal, this fissure, instead of appearing as a wide, shallow depression, has the form of a narrow cleft with a depth of three-quarters to one inch. This form, as in the case of the umbilical fissure, and that of the ductus venosus, results from the folding together of the portions of the liver bounding these fissures. At the *bottom* of the fissure the right and left hepatic ducts unite to form the hepatic duct proper; at its *mouth* this latter unites with the cystic duct to form the common bile duct.

Renal Impression.—In many specimens of hardened livers this impression belongs rather to the posterior than to the inferior surface of the liver.

Like the portal fissure, the umbilical fissure and the fissure of the ductus venosus are deep clefts—deeper still than the portal—formed by the folding over of the left lobe against the right, as already explained. To these three only can the term fissure be properly applied. The depressions for the cava and the gall-bladder, often called fissures, are more properly known as fossæ. In the *Anatomische Nomenclatur* all five are called fossæ, a term not at all applicable to the first three.

The attachment of the *left lateral ligament* to the diaphragm lies nearly altogether to the left of the œsophageal orifice, and about three-quarters of an inch (18 mm.) in front of the line of this opening. Very often, too, it is directed from the diaphragm backwards to its hepatic attachment.

Hepatic Duct.—As a rule five or six ducts leave the liver at the bottom of the portal fissure. These generally unite into right and left main ducts; sometimes, on the other hand, they all converge towards, and unite at the beginning

of, the hepatic duct. It is interesting to note that the ducts from the Spigelian and caudate lobes join the left main duct. Formed at the bottom of the portal fissure, the hepatic duct lies practically altogether within that fissure, and joins the cystic duct at its mouth to form the common bile duct.

The *cystic duct* is usually somewhat longer than the hepatic; the former measures from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches, the latter from 1 to $1\frac{1}{4}$ inches.

PANCREAS.

The *neck* (specially described by Symington) forms as distinct and definite a division as any other portion of the gland.

The *omental tuberosity* is very rarely, if ever, I think, as large, when normal, as is represented in His' model, which appears to have been prepared from an imperfectly hardened pancreas. Generally the tuberosity is insignificant, and is probably due to the pressure of the duodeno-jejunal flexure below, and of the suspensory muscle of Treitz behind, on this part of the gland. When the stomach is empty and contracted the tuberosity will often be found, not above the lesser curvature, but projecting below the pyloric part of the great curvature.

I can see no reason for altering the description of the surfaces and borders of the pancreas which I have already given in a previous volume of the "Transactions."

I have never failed to find an *accessory pancreatic duct* joining the duodenum in any case in which I have made a thorough search for it. It opens into the duodenum about three-quarters of an inch above and somewhat in front of (*i.e.*, ventral to) the pancreatic duct. From the duodenum it runs to the left and downwards, and soon divides into two or more branches, one of which joins the pancreatic

duct; the others pass down and receive the ducts from the lower part of the head.

The blood-vessels of the pancreas are, as a rule, very loosely described. The following account gives briefly the average of several dissections:—(1) *The superior* (or anterior) *pancreatico-duodenal* artery runs down on the front of the head, sending branches outwards to the duodenum, as well as numerous twigs into the substance of the pancreas; (2) *the inferior* (or posterior) *pancreatic duodenal*—a branch of the upper part of the superior mesenteric artery—runs upwards and to the right across the back of the head of the pancreas, and sends branches to it and to the duodenum, one of which runs between the head and the duodenum (these two arteries anastomose by several branches around the inferior border of the head); (3) the *inferior pancreatic* branch of the superior mesenteric (or sometimes of the gastro-duodenal) artery, a considerable branch which arises along with, or near the last; it runs along the lower border of the pancreas, often even as far as its tail; (4) the *pancreatic* branches of the splenic, three to five in number, are fair-sized branches which enter the pancreas immediately, and transverse its substance from above downwards; (5) small *pancreatic branches* also arise from the *hepatic*, whilst it rests on the upper part of the gland, which they enter immediately. The *pancreatica magna*, which is described as accompanying the duct, does not seem to exist; at least I have often sought but never found it.

The veins are—(1) An *anterior* (or inferior) *pancreatico-duodenal*, which passes down, and to the left, on the front of the head, and joins the superior mesenteric; (2) a *posterior pancreatico-duodenal*, which crosses the back of the head, and opens into the portal; (3) several small pancreatic veins which join the splenic.

Professor Waldeyer has described under the name of *paravesical fossa* a depression seen at each side of the empty bladder. This depression, which is crossed by a fold of peritoneum—*plica vesicalis transversa*—is obliterated by distension of the bladder, and disappears as a fossa. My hardened specimens agree in general with Waldeyer's description of the paravesical fossa, and the same remark applies to his fossa obturatoria, but I do not think that he has completely disposed of the portion of the peritoneum which lies behind the line of the ureter. As, however, I hope to return to this subject in a future communication, I shall only refer here to a very distinct fossa seen on the posterior wall of the pelvis, at each side of the empty rectum, which I have described as the *pararectal fossa*. It corresponds exactly in its characters to the paravesical fossa, and, like it, it practically disappears when the rectum is distended. I have already referred to it in connection with the rectum.

The arrangement of the mesentery has already been described under the heading of "Small Intestine," and the left lateral ligament of the liver has been referred to in connection with the liver. As regards the *coronary ligament* of the liver, I would point out that the area enclosed by this structure is three-sided, and that the ligament is made up of three layers—namely, an upper and a lower, as usually described—the former passing from the back of the right lobe to the diaphragm, the latter from the back of the same lobe to the diaphragm and right kidney—and a third or left layer which passes from the diaphragm to the liver along the right margin of the Spigelian lobe, and is nearly vertical in position.

I do not think that the attachment of the left or posterior portion of the lesser omentum is accurately shown in any

illustration or model with which I am acquainted. This attachment can only be seen when the left and Spigelian lobes are separated, for it takes place at the bottom of the fissure of the ductus venosus—not on the *surface* where the left and Spigelian lobes meet behind, as usually shown. In other words, the omentum is buried to a depth of over one inch in the fissure.

I have nothing to add to Jonnesco's description of the peritoneal fossæ around the duodenum, nor to the account of the pericæcal fossæ given by Berry, both of which are accurate and exhaustive.

Dr. Patten said that in some investigations which he had recently made he had noted that as we ascended the scale from the lower animals there was an increasing tendency for the long axis of the stomach to become somewhat oblique, while, at the same time, the transverse colon became more distinctly marked. Was the transverse colon the principal factor in determining this change in the position of the stomach?

Mr. Taylor said he had examined some formalin subjects from a surgical standpoint, and could bear out all Professor Birmingham had said regarding the position of the stomach. One point had impressed him very much in connection with gastro-enterostomy. The operation adopted for a long time, and still adhered to by some surgeons, was to take a piece of the small intestine, bring it up over the transverse colon, and fix it to the upper wall of the stomach. Now the beginning of the small intestine occupies a deep recess in the left region of the abdomen below the stomach, from which it is separated by the transverse mesocolon only, as just pointed out by Professor Birmingham. If the mesocolon be torn through, and this portion of the intestine connected to the under surface of the stomach, the result will be that the intestine will be connected to the lowest part of the stomach, and thus gravity will assist the passage of the food into the intestine.

Professor Birmingham, in reply to Dr. Patten's question, said he thought the obliquity in the human stomach was probably due to the wide thoracic framework. In a female subject with a very constricted waist, the stomach (which he exhibited) lay almost

vertically on the left side of the vertebral column. Regarding the question of the existence of a valve at the cardiac orifice, he thought that little reliance could be placed on observations made on dried specimens. The return of food from the stomach into the œsophagus would be amply guarded against by the contraction of the muscular fibres of the œsophagus and the crura of the diaphragm, as illustrated by a specimen exhibited.

A DEMONSTRATION OF SOME SPECIMENS OF THE NASAL FOSSA, ILLUSTRATED BY LANTERN SLIDES.

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DESCRIPTION.

FIGURE 1 is a coronal section seen from behind, and showing the shape and general relations of the nasal fossæ. Thus each fossa is seen to be roughly triangular in shape, with the base below at the palate, and the apex above at the cranial cavity. The mesial wall is straight and smooth, formed by the septum nasi I, which separates the fossæ from each other. The outer wall, on the contrary, is curved and rendered uneven by three well-marked bony projections, D, E, and G, known respectively as the superior, middle, and inferior turbinated bones. The two upper are part of the ethmoid, the lower is an independent bone applied to the inner side of the superior maxilla. It will be seen that these bones form three passages along the outer wall of the nasal fossa—namely, the superior, middle, and inferior meatus. The roof is seen to be very narrow, formed by the cribriform plate of the ethmoid, which separates it from the cranial cavity A. The floor is wider and stronger, being formed by the hard palate H, which separates the nasal fossæ from the mouth. Thus it is seen that the nasal fossæ occupy the middle of the face, with the cranial cavity above and the mouth below. To the outer side the relations are apparent and important. The orbit B is seen to be separated from the upper part of each fossa by large ethmoidal cells C, while the antrum of

Highmore lies adjacent to the lower part, and opens into the middle meatus by an aperture seen above F. It is noteworthy that the floor of the antrum is lower than the floor of the fossa, while the opening of the antrum is very high up, which explains how a large collection of pus may take place in the antrum, and its presence made manifest by simply lowering the patient's head. The projection seen lying in the concavity of the middle turbinated bone E is the bulla ethmoidalis (Zukerkandle).

Figure 2 is a sagittal section showing nasal fossa, naso-pharynx, and mouth. The roof of the nasal fossa is seen to consist of three parts—a middle ethmoidal part horizontal, an anterior nasal part sloping downwards and forwards, and a posterior sphenoidal part sloping downwards and backwards. The floor is seen to be formed by the hard palate J, and in part by the upper lip I. The anterior aperture (nostril) is seen below D, looking downwards and forwards, and opening externally, while the posterior aperture (choana) lies under G, leading into the naso-pharynx H. The inner wall (septum nasi) has been removed with the exception of the posterior part of the vomer G. The outer wall in the recent state is seen to present the follow-ing parts for examination :—Situated immediately above the nostril is the vestibule D, an oval-shaped depression lined with skin and bearing hairs (vibrissæ); marking off the vestibule from the nasal fossa proper is a curved ridge, the limen vestibuli (between D and E). Here the skin changes into the Schneiderian membrane. Above the limen is seen the expanded anterior part of the meatus forming a smooth-walled chamber known as the atrium E. Above the atrium is seen a low ridge running downwards and forwards from the anterior part of the middle turbinated bone B. This ridge is the rudiment of a naso-turbinal present in most mammals, and is called the agger nasi F.
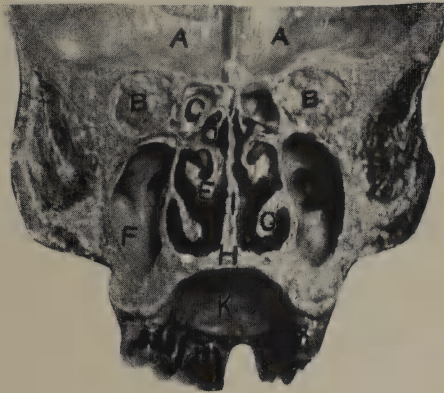
Fig. 1.—Coronal section through the nasal fossæ and adjacent parts, seen from behind.

A A, cranial cavity; B B, orbits; C, ethmoidal cells between orbit and nasal fossa; D, superior turbinated bone; E, middle turbinated bone (above E, in the middle meatus, is the bulla ethmoidalis); F, antrum of Highmore (its opening into the middle meatus is seen high up above F); G, inferior turbinated bone; H, hard palate; I, septum nasi, showing spur to the right; K, roof of the mouth.
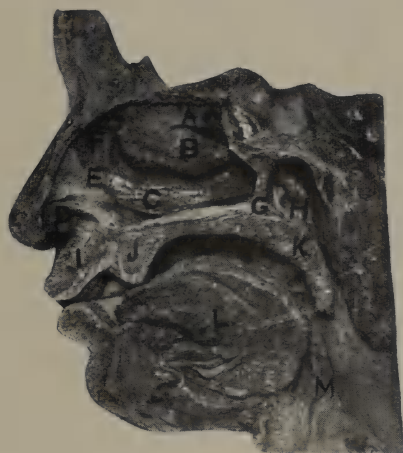
FIG. 2.—Sagittal section through nasal fossa, naso-pharynx, and mouth.

A, superior turbinal bone (behind A is seen a fourth meatus), between A
    and B, the superior meatus; B, middle turbinated bone (between B
    and C, the middle meatus); C, the inferior turbinated bone (between
    C and J, the inferior meatus); D, vestibule (between D and E, limen
    vestibuli); E, atrium meatus medii; F, agger nasi (above F, sulcus
    olfactorius); G, posterior part of vomer; H, placed in naso-pharynx
    on the salpingo-pharyngeal fold (above and in front is the opening of
    the Eustachian tube); I, upper lip; J, hard palate; K, soft palate;
    L, tongue; M, epiglottis.
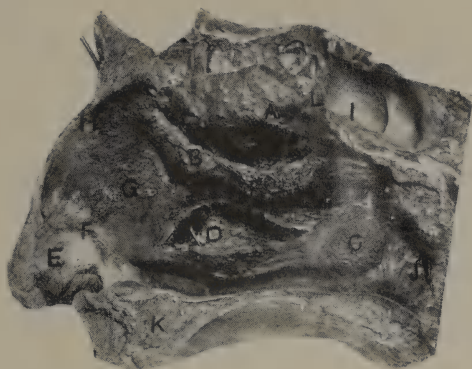
Fig. 3.—Section showing outer wall of right nasal fossa.

The middle turbinated bone is partly removed to show the bulla ethmoid-
alis and the processus uncinatus. They are seen in a line drawn
from A to B, the processus just above B, the bulla below and slightly
in front of A. A style is passed through the nasal duct, and the
inferior turbinal partly removed to show the opening of the duct into
the inferior meatus, D. A, superior turbinated bone; B, middle tur-
binated bone; C, pathologically enlarged posterior end of inferior
turbinated bone; D, opening of nasal duct; E, vestibule; F, limen
vestibuli; G, atrium meatus medii; H, sulcus olfactorius; I, sphenoidal
sinus; J, opening of Enstachian tube; K, palate; L, spheno-ethmoidal
recess. Below L, and to the right of A, is a fourth meatus.
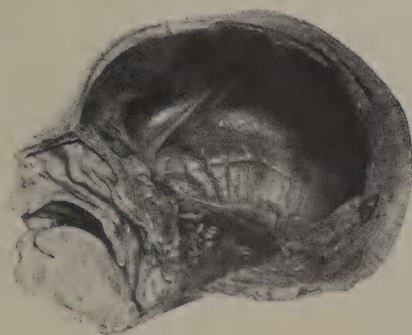
Fig. 4.—Section through nasal fossa, naso-pharynx, and mouth of a fœtus

The superior turbinated bone has an antero-posterior fissure as in No. 2
The middle turbinated has also an antero-posterior fissure not seen
in any of the other specimens.
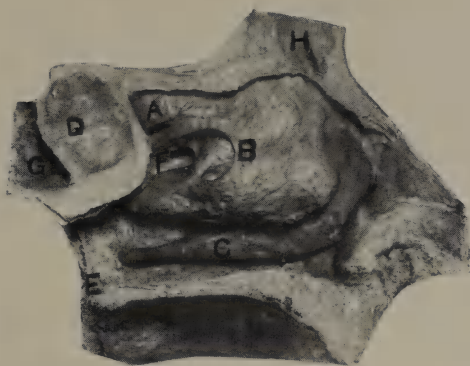
Fig. 5.—Sagittal section, showing outer wall of left nasal fossa.

The most remarkable thing about this specimen is the extremely large size of the middle turbinal bone, B. This bone is hollow, the opening into the concavity being seen immediately behind B. To the outside of this large middle turbinal, growing from the processus uncinatus, is a small polypus. The antrum has two openings, the higher one communicating with the anterior ethmoidal cells.

A, superior turbinated bone; B, middle turbinated bone, very large, and containing a cavity; C, inferior turbinated bone; D, septum between the sphenoidal sinuses; E, naso-pharyngeal fold; F, superior meatus (between F and A is seen a fourth meatus); G, sphenoidal sinus; H, frontal sinus.

Fig. 6.—Horizontal section through nasal fossæ and antra of Highmore, seen from below.

A, left antrum; B, opening of right antrum; C, right inferior turbinal bone; D, septum nasi, showing spur; E, placed on deflected septum higher up.
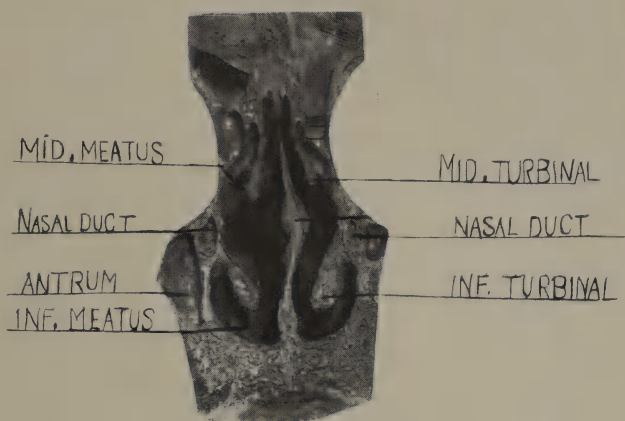
Fig. 7.—Coronal section to show the relations of the lower part of the nasal duct. Thus, on the left hand side, where the duct is wide open, the orbit is seen to lie above and on the outer side; the antrum, below and on the outer side; the middle meatus on the inner side above; the inferior turbinal and the inferior meatus on the inner side below. The duct on the right hand side has a very thick wall, and is nearly obliterated. The two sides are markedly asymmetrical.
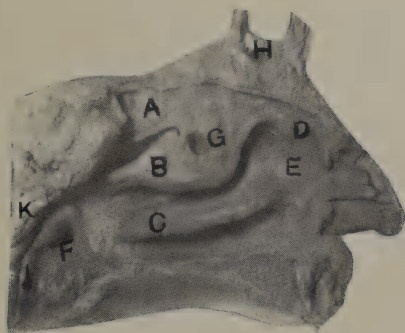
Fig. 8.—Sagittal section, showing outer wall of left nasal fossa.

A, superior turbinal bone; B, middle turbinal bone, containing a cavity; C, inferior turbinal bone; D, agger nasi; E, atrium meatus medii; F, opening of Eustachian tube; G, opening leading to cavity in middle turbinal bone; H, frontal sinus.

Above F, running to the roof, is seen a groove called the sulcus olfactorius. Two projections from the lateral mass of the ethmoid are seen. The superior found close to the roof, and only in the posterior part of the nasal fossa, is small in size, and is known as the superior turbinated bone A. It overhangs a groove-like space known as the superior meatus (between A and B); into this space open the posterior ethmoidal cells. Posterior to A is seen a groove separating the superior turbinal into an upper and lower part. This groove is called the fourth meatus, and the condition here present is said by Zukerkandle to be the most common condition in man. Joined to the superior turbinated bone in front, but extending more anteriorly, and seeming to descend from the cribriform plate by a straight anterior margin, is the middle turbinated bone B. Its lower free margin, which is nearly horizontal, overhangs a somewhat triangular-shaped passage (the base being in front) known as the middle meatus between B and C. Lying below the middle meatus is seen the inferior turbinated bone C, and still lower down, between C and J, is seen the anterior part of the inferior meatus leading backwards from the vestibule.

NOTE ON THE CONFIGURATION OF THE HEART IN MAN AND SOME OTHER MAMMALIAN GROUPS.

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MANY of the mammalian hearts which I have examined were first hardened *in situ* with strong solutions of formalin injected through the femoral artery. I found that the human heart differed considerably in shape from those of the following lower animals which I dissected:—

(A.) ORDER MARSUPIALIA—

Macropus robustus.

(B.) ORDER RODENTIA—

1. Lagostomus trichodactylus.

2. Sciurus vulgaris.

3. Mus decumanus.

(C.) ORDER CARNIVORA—

1. Felis concolor.

2. F. domestica.

(D.) ORDER PRIMATES—

a. Catarrhine apes.

1. Macacus innuus.

2. Cynocephalus babuin.

β. Anthropomorphous apes.

1. Hylobates hainanus.

A certain amount of difference could be made out in the general configuration of the hearts of the above-mentioned groups. In Felis the ventricles are rather long and pointed,

in Sciurus, Mus and Lagostomus they are shorter, with a more obtuse apex; however (excepting the primates), these hearts possessed the following characters :—

1. Conical in shape.

2. Position in the thoracic cavity almost parallel with the mesial plane.

3. The margo acutus, according to position, is a right border.

4. Only a small part of the posterior surface (*facies diaphragmatica*) of the ventricles rests on the diaphragm (the pericardium intervening). This surface is usually not flattened, and looks backwards as well as downwards.[a]

5. The inferior vena cava within the thorax consists of a very *short* intra-pericardial stage (as in man) and a longer extra-pericardial stage.

The formalin heart in man contrasts with the above as follows :—

1. It is rather trihedral than conical in shape.

2. It lies very obliquely in the thoracic cavity.

3. The margo acutus is, according to position, much more of an antero-inferior than a right border.

4. The whole of the *facies diaphragmatica* (so-called posterior surface of the ventricles) rests on the diaphragm (the pericardium intervening), is, as a rule, flattened, and looks almost directly downwards.

The extra- as well as the intra-pericardial stages of the thoracic inferior vena cava are very short.

The difference in position of the margo acutus of the human heart, as compared with the same in lower animals, seems to depend on—The very oblique position which the heart of man has assumed in the thoracic cavity, together with the shortening of the *extra-pericardial* part

[a] In describing the above mammalian hearts the animals are supposed to be in the erect posture.

of the inferior vena cava. These changes seem to have taken place as the heart more intimately approached the diaphragm, the organ subsiding, as in the case of many other viscera, as man assumed the erect posture.
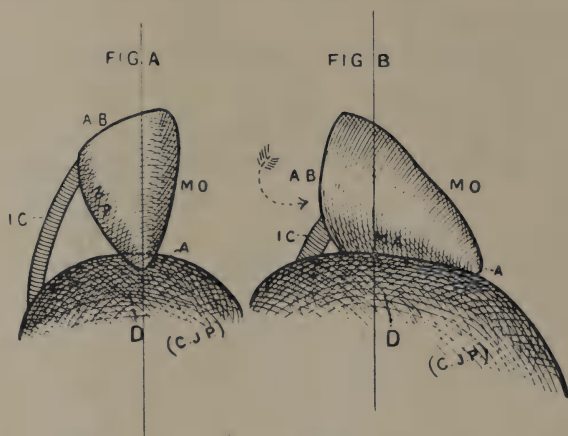
Two schematic diagrams showing the configuration of a typical quadru-
pedal heart as seen from the front (Fig. *A*) as contrasted with that
of man (Fig. *B*) viewed from the same aspect. The corresponding
borders of the two hearts are lettered similarly, but observe how
these borders, together with the apex, have changed position in
Fig. *B*, as the Human heart has rotated (in the direction of the
arrow), with *pari passu* shortening of the extra-pericardial stage
of the thoracic inferior vena cava.

> A. B. = Auricular border.
> M. A. = Margo acutus.
> M. O. = Margo obtusus.
> I. C. = Inferior cava.
> A. = Apex.
> D. = Diaphragm.

The result is that in man the right auricle, in its lower part, approaches, and even touches, the diaphragm (the pericardium intervening), extending lower down than in the case of quadrupeds. In tracings taken of the shape of the human heart *in situ* (not necessarily hardened in formalin) it may be seen that the lower end of the right

auricle extends nearly as far down on the right side as the level of the ventricular apex on the left side. Hence, the border joining the two (margo acutus) runs almost transversely across the chest from right to left (Plate II., m. a.).
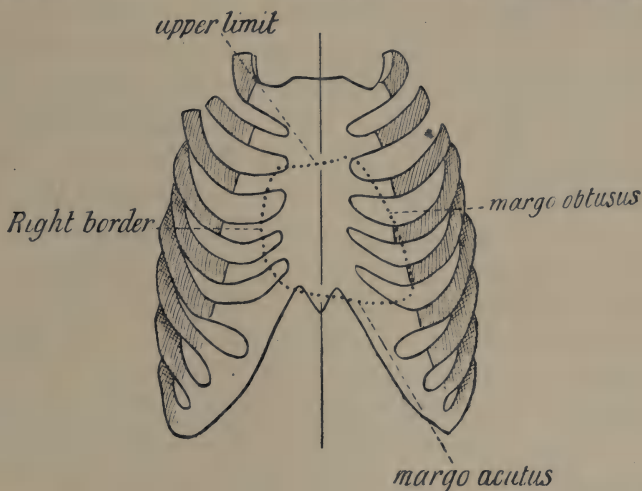
Configuration of the Human formalin heart mapped out on the surface of the chest wall.

The position of the *right border* or margin of the heart *in man* is indicated on the surface of the chest wall by a line drawn from the sternal end of the upper surface of the third right costal cartilage to the seventh costo-sternal articulation. This line is slightly curved, with its concavity looking inwards, the summit of the curve being $1\frac{1}{2}$ inches from the middle line. It corresponds to the right border of the right auricle in its entire vertical extent (Plate I., Figs. *A* and *B*, R. B.).

This border terminates below by meeting the right extremity of the margo acutus at almost an angle of 90° (Plate I., Fig. *A*). The remaining borders which may be made out in the heart, specially hardened with formalin, are the margo obtusus, or left ventricular border, and a border

separating the back of the auricles from the *facies dia-phragmatica.* Thē latter, from its position, may be called a *posterior* border (Plate I., Fig. *B*, P. B.). As we descend in the animal scale it becomes less marked. I found it distinct in the hearts of two Gibbons which I examined.

RELATIONS OF THE BORDERS OF THE HEART TO THE ANTERIOR CHEST WALL.

These are given in most text-books, so I shall merely point them out. The right, or auricular border, has already been indicated. It takes a vertical, but slightly curved course. The margo acutus, or antero-inferior border, runs transversely, or nearly so, from the seventh right chondro-sternal articulation to the ventricular apex. The latter is situated in the fifth left inter-costal space, $3\frac{1}{2}$ inches from the middle line. The margo obtusus (left border) extends from the apex upwards and inwards to the lower surface of the second left chondro-sternal articulation. To complete the configuration of the heart we must indicate on the surface the upper limit. This " is represented by a line passing from the lower border of the second costal cartilage of the left side to the upper border of the third cartilage of the right side " (Quain). I mention these surface markings of the borders of the heart because I wish to point out that the figure thus mapped out on the anterior chest wall *corresponds in outline to* the configuration of the formalin heart as seen from the front. But to demonstrate this it is not even necessary to harden the viscus. Open the peri-cardium from the front carefully with a crucial incision, turn out the flaps and view the heart *in situ.* Its con-figuration will be seen to correspond to that of the anterior aspect of the formalin heart; but when an ordinary dis-secting room specimen is lifted, even partially, out of the pericardial sac it loses its proper form owing to the

collapsing of the flaccid and often empty chamber of the right ventricle. Hence it is necessary to harden the organ in order to get a proper idea of the form of its *inferior* and *posterior aspects*.

The Surfaces.—In hearts removed from the pericardial sac and hardened with formalin I could make out THREE distinct surfaces (Plate I. Figs. *A* and *B*). They are separated from each other by more or less distinct borders. The surfaces are as follow :—

1. Anterior (*facies sternalis*), which looks forwards and downwards and is CONVEX IN SHAPE.[a] It is separated from the " basal " or inferior surface by the margo acutus and margo obtusus, and from the posterior or auricular surface by the margo obtusus and right or auricular border.

2. The *inferior* or " *basal* " *surface* (*facies diaphragmatica*), generally described as *posterior*. As already mentioned, it is distinctly flattened, and looks almost *directly downwards*. This surface is triangular in outline (Plate I., Fig. *B*, I. S.), and I have called it "*basal*" because it is that part of the heart which fits into and fills up the *expanded basal part of the pericardium* where the latter is attached to the diaphragm. The basal surface of the heart is separated from the anterior surface by the margo obtusus and margo acutus, and from the posterior surface by the posterior border.

3. The *posterior or auricular* surface. This includes the back of the auricles. It looks directly backwards, and opening into it are the inferior and superior cavæ and the right and left pulmonary veins. It is separated from the other surfaces by the borders already mentioned.

In the quadrupeds which I dissected I found that the posterior and basal surfaces were not distinctly marked off from each other.

[a] The convexity of the anterior surface should be carefully observed, as it must be remembered that three plane or flat surfaces could not inclose a space.

From the above description of the human heart it seems that there is a close correspondence in shape between the fibrous pericardial sac and the heart, which it contains. The pericardium is a somewhat triangular-shaped cavity, broad and expanded below, where it is attached to the diaphragm, and narrowed considerably above, where it blends gradually with the sheaths of the great vessels which spring from the heart (Plate III., Fig. *A*). Likewise, the heart is broad and expanded below, where it rests on the diaphragm (the pericardium intervening). This part of the organ includes the *inferior* or *basal* surface, the lower part of the *posterior* surface, the intervening borders, together with the ventricular apex (Plate I., Fig. *B*, and Plate III., Fig. *C*). The upper part of the heart,[a] where the great vessels arise (part of the so-called base), becomes narrowed like the pericardium.

It appears that the part of the heart which has hitherto been termed the "*base*" seems to be a rather indefinite portion both in position and extent. I found, however, that in hearts hardened with formalin the *posterior* surface, which is generally distinct, includes the greater part of the "base." It is evident that from the shape and position of the formalin heart a more extensive area of the cardiac surface is intimately related to such abdominal viscera as the stomach and liver (the pericardium and diaphragm alone intervening) than is generally supposed. This has its practical importance, and may explain more fully the frequent purely functional cardiac derangements following temporary distensions or enlargements of the abdominal viscera above mentioned. In certain morbid conditions of the heart I frequently found an increased amount of the cardiac surface related to the basal pericardium.

In a greatly enlarged heart, which occurred in the

[a] The anatomical apex of Keiller (*vide American Journal of Medical Science*, April, 1898).

Anatomical Department of Trinity College last winter, I noted that not only the "*basal*" surface, but even a considerable part of the "*posterior*" surface, rested on the diaphragmatic pericardium. The same thing I observed in two hearts in which the right ventricles were markedly dilated.

So much for the configuration of the human heart. I have considered it advisable to avoid entering into anything like a detailed description of the shape of the organ as observed in specimens specially hardened *in situ* with formalin. My aim has been chiefly to indicate the extent to which the heart has deviated in shape from the conical mammalian type, as it has come to occupy such a very oblique position in the thoracic cavity.

I shall now give a brief description of the configuration of the heart as observed in the full-time human fœtus and in a few other mammalian orders. I also append two tables, one containing some heart and chest measurements, the other containing cardiac and thoracic Indices which were worked out from the measurements in Table No. 1.

Heart of Human Fœtus (full time).—It occupies a large area of the thorax, lying very obliquely. It is placed behind the second, third, fourth, fifth, and sixth costal cartilages of the left side, and behind the second, third, and fourth costal cartilages of the right side.

The transverse diameter of the heart is greater in proportion than in the adult. The apex is short and rounded, and is somewhat deeply placed in the fifth intercostal space of the left side. The right auricle is large, and much of it occupies the anterior aspect of the heart.

As in the adult, the pericardium is spread out, and attached extensively to the diaphragm. The ventricular surface of the heart which rests on the diaphragmatic

pericardium is flattened, and marked off from the back of
the auricles by a more or less rounded border. The mesial
plane cuts through the left third of the right ventricle
(Plate III., Figs. *A*, *B*, *C*).

ORDER MARSUPIALIA.

Heart of Macropus Robustus.—Somewhat obliquely
placed in the thorax; lies behind the second, third,
fourth, and fifth costal cartilages of the left side, and the
second, third, and fourth of the right side. The apex is
rounded, and situated a little to the left of the middle line.
The mesial plane passes through the anterior inter-
ventricular septum. The heart is somewhat conical in
shape, and is not much longer than it is broad. The
inferior cava is long, and very little of the pericardium
touches the diaphragm. This is chiefly due to the large,
much-curved " *azygos* " lobe of the right lung intervening
between the diaphragm on the one hand and the lower
surfaces of the ventricles of the heart and pericardium on
the other. The pericardium is loosely attached to the
back of the sternum (Plate V., Fig. *C*).

ORDER RODENTIA.

Hearts of (*a*) *Lagostomus trichodactylus,*

(*b*) *Sciurus vulgaris,*

(*c*) *Mus decumanus,*

more mesially situated than that of Macropus. The apex
in each case is blunt and rounded; the heart lies behind
the second and third costal cartilages of both sides; the
mesial plane passes through the anterior inter-ventricular
furrow. The heart of each of these mammals is short
and thick, and the under surface of the pericardium is
attached to the diaphragm by a thin membranous fold of
connective tissue. This spreads out as it approaches the
diaphragm, being narrow above where it is attached to

the under surface of the pericardium. The attachment of
the pericardium to the diaphragm is very slight (Plate V.,
Figs. *A* and *B*).

ORDER CARNIVORA.

Hearts of (*a*) *Felis concolor*, and
   (*b*) *F. domestica.*

They occupy a mesial position within the thorax, so that
the mesial plane passes through the apex of the ventricles.
The ventricular portion of each is longer and narrower,
and the apex more pointed, than in the preceding groups.
The antero-posterior diameters greatly exceed the lateral.
These hearts lie behind the third, fourth, fifth, and sixth
costal cartilages of both sides.

The attachments of the pericardium to the diaphragm
resemble the condition found in the *Rodentia* dissected,
but the membranous fold of connective tissue is less ex-
tensive in the above *Carnivora*. The attachments of the
front of the pericardium to the back of the sternum are
more intimate in the latter than in the former. In *Felis
concolor* and *F. domestica* I found that the outer border
of the right auricle and the margo acutus are directed
nearly in a straight line,[a] and only a small area of the back
of the ventricles, near the apex, touches the diaphragm,
the pericardium intervening.

ORDER PRIMATES.

1. **Hearts of catarrhine apes :—**
   (*a*) *Macacus innuus.*
   (*b*) *Cynocephalus babuin.*

Position slightly oblique; therefore, apex to the left of
the mesial plane; more so in the young than in the adult.
Hearts rather shortened and broader proportionately in
the transverse direction than in the preceding order.

[a] That is to say that the meeting of the auricular border with the margo
acutus does not form an angle which is so apparent in the human heart.

The pericardium is not extensively attached to the diaphragm, but a considerable area of it is spread out on that structure. It follows from this that more of the ventricular surface of the heart is in relation to the diaphragm (the pericardium intervening) than in the case of preceding orders. This surface of the ventricles is somewhat flattened, and represents the basal surface of the human heart. It is marked off indistinctly by a posterior border from the back of the auricles.

In *Macacus innuus* the heart and thorax are broader in proportion than in *Cynocephalus babuin.*

2. ANTHROPOID APES : —

Two hearts of *Hylobates hainanus.*
Very similar to that of man both in position and shape. The apex is somewhat more pointed in the former. In *Hylobates* the pericardium is spread out, and is extensively and firmly attached to the diaphragm. The ventricular surface (" inferior or basal ") in relation to the diaphragmatic pericardium is correspondingly extensive, and, as in the heart of man, it is flattened, and marked off from the anterior and the posterior surfaces by distinct borders.

The transverse and antero-posterior diameters of the heart of *Hylobates* are of equal extent. (See Cardiac and Thoracic Indices.) The lateral and antero-posterior diameters of the thorax are also of equal extent. (Plate IV., Figs. *A* and *B*).

CONCLUSION.[a]

In conclusion, let me add that my remarks on the configuration of the heart in man have not been based

[a] Since I have written this article, and whilst it is still in press, I have seen Professor Keiller's very interesting recent paper on the " Descriptive Anatomy of the Human Heart," published in the *American Journal of Medical Science* for 1898. The author treats of the shape of the formalin heart, and although I worked out my results quite independently of his, yet in many essentials we agree. Professor Keiller, however, describes five surfaces separated by borders, the heart being pyramidal in form with a clinical and anatomical apex.

on observations made on only one or two specimens. Last winter I examined in all 50 hearts, 10 of which were specially hardened in formalin. Those which were not hardened I avoided displacing as they lay in the sac of the pericardium, and so proceeded as follows :—I opened the pericardium from the front with a crucial incision, separated the four flaps by turning them outwards, and at once took a tracing of the form of the heart. From the tracings, as well as from the actual specimens, my friend, Mr. C. K. Bushe, kindly made me some drawings (see Plate II.). In each case I measured the greatest transverse and antero-posterior diameters. I afterwards excised the hearts, and further examined them, in order to determine whether they were diseased or healthy, and of the average size and weight. I further noted the sex and age of the subject from which each was taken.

Table showing the Greatest Transverse and Antero-posterior Diameters of the Heart and Thorax in different Mammalian Groups, from which the Cardiac and Thoracic Indices have been calculated.

NAME	ORDER	HEART		THORAX	
		Greatest transverse diameter	Greatest antero-posterior diameter	Greatest transverse diameter	Greatest antero-posterior diameter
Macropus robustus	Marsupialia	$2\frac{1}{4}$*	3	5	6
Lagostomus trichodactylus	Rodentia	$1\frac{1}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$	3
Felis concolor	Carnivora	$1\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$6\frac{1}{2}$
Macacus innuus	Primates	2	$2\frac{1}{4}$	4	5
Cynocephalus babuin	,,	$1\frac{1}{4}$	$1\frac{1}{2}$	3	4
Hylobates hainanus	,,	$1\frac{1}{2}$	$1\frac{1}{2}$	4	4
Fœtus (human), full time	,,	2	$1\frac{1}{2}$	4	3
Man (adult)	,,	5	4	12	8

* All the numbers refer to inches and fractions of an inch.

Table showing the Cardiac and Thoracic Indices in different Mammalian Groups.

NAME	ORDER	HEART		THORAX	
		Transverse index	Antero-posterior index	Transverse index	Antero-posterior index
Macropus robustus -	Marsupialia -	75	133	83·2	120
Lagostomus trichodactylus -	Rodentia -	83·1	120	83·2	120
Felis concolor -	Carnivora -	50	183·1	53·11	188·4
Macacus innuus -	Primates -	88·8	112·1	80	120
Cynocephalus babuin -	,, -	83·1	120	75	133·1
Hylobates hainanus -	,, -	100	100	100	100
Human fœtus, full time -	,, -	133	75	133	75
Man (adult) -	,, -	125	80	150	66·8

From the above Indices a correspondence can be made out between the transverse and antero-posterior diameters of the heart and of the thorax in each animal.

EXPLANATION OF THE PLATES.

PLATE I.

Two drawings of a human heart which was hardened *in situ* with strong injections of formalin.

Fig. *A.*—From the right side.

    A. S. = Anterior surface.

    m. a. = Margo acutus.

    a. = Apex of ventricles.

    R. B. = Right border of right auricle.

Fig. *B.*—From below and behind.

    I. S. = Inferior or " basal " surface.

    L. A. = Left auricle (posterior aspect).

    R. A. = Right   ,,   ,,   ,,

    I. C. = Inferior cava.

    S. C. = Superior cava.

    L. P. V. = Left pulmonary vein.

    R. P. V. = Right pulmonary ,,

On posterior surface of heart.

m. a. = Margo acutus.

m. o. = Margo obtusus.

p. b. = Posterior border.

r. b. = Right border.

PLATE II.

Drawing from a tracing of the Human heart taken *in situ*, after opening the pericardium from the front with a crucial incision.
This illustration is made from the heart of an ordinary dissecting-room subject not hardened with formalin.

m. a. = Margo acutus.

r. b. = Right border.

m. o. = Margo obtusus.

a. = Apex.

PLATE III.

Heart and pericardium of full-time Human fœtus (male). The subject was hardened with formalin.

Fig. *A.*—The front wall of the fibrous pericardium has been cut away in order to show the shape of the interior of the sac. The openings of the various vessels belonging to the heart are seen piercing the posterior wall. The expanded basal portion of the pericardium attached to the diaphragm is shown at D.

N.—The narrow upper part of the fibrous pericardium.

Fig. *B.*—Heart viewed from the front. Observe the correspondence in shape between the heart and pericardium.

The right auricle is greatly engorged with blood, and so the right border (R. B.) is rounded, and somewhat ill-defined.

m. a. = Margo acutus.

a. = Apex.

m. o. = Margo obtusus.

a. s. = Anterior surface.

p. = Basal pericardium.

d. = Diaphragm.

Fig. *C.*—Heart seen from below, showing the flattened inferior surface of the ventricles (I. S.).

p. b. = Posterior border.

m. a. = Margo acutus.

m. o. = Margo obtusus.

a. = Apex.

p. s. = Part of posterior surface.

PLATE IV.

Heart of Hylobates hainanus (*Hainan Gibbon*) (male).

Fig. *A.*—From right side.

m. a. = Margo acutus.

r. b. = Right border.

i. c. = Inferior cava.

a. = Apex.

a. s. = Anterior surface.

p. = Pericardium.

Fig. *B.*—From the front. Lettered as in Fig. *A.*
m. o. = Margo obtusus.

PLATE V.

Hearts of Lagostomus trichodactylus and Macropus robustus.

Fig. *A.*—Heart of Lagostomus, seen from the front. Note its mesial position. The vertical line represents the mesial plane.

a. s. = Anterior surface.
m. a. = Margo acutus.
m. o. = Margo obtusus.
a.   = Apex.
m. f. = Membranous fold connecting the pericardium to the diaphragm.
d.   = Diaphragm.

Fig. *B.*—Inferior aspect of same heart, showing membranous fold (m. f.) and pericardium (p.). A pin is seen shining through latter.

Fig. *C.*—Front view of the heart and lungs of Macropus.

a. s. = Anterior surface.
m. a. = Margo acutus.
m. o. = Margo obtusus.
a.   = Apex.
r. l. = Right lung.
l. i = Lobus impar of right lung.
l. l. = Left lung.
p.   = Pericardium.
d.   = Diaphragm.

The vertical line represents the mesial plane.

The pericardium is separated from the diaphragm by the base of the right lung and the " lobus impar " or " *azygos* " lobe.

PLATE I.
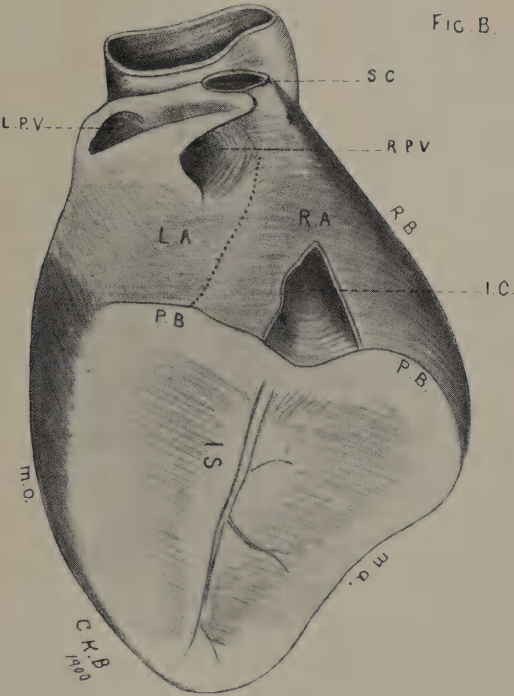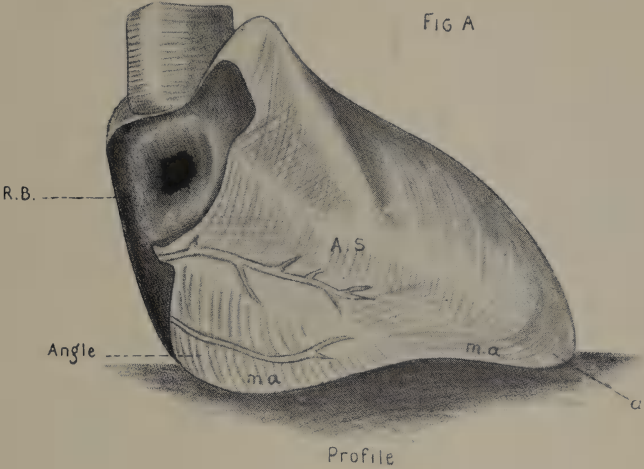
Human heart of an adult male, hardened *in situ* and subsequently excised.

PLATE II.
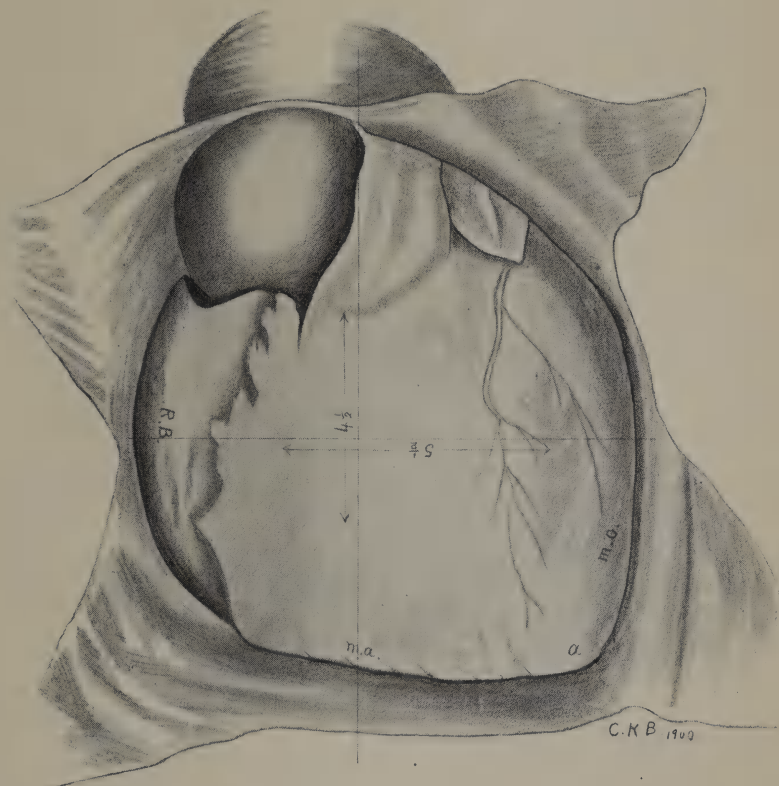
Human heart of an adult male viewed from the front as it lies undisturbed
in the Pericardial sac. The latter has been opened with a crucial
incision.

PLATE III.
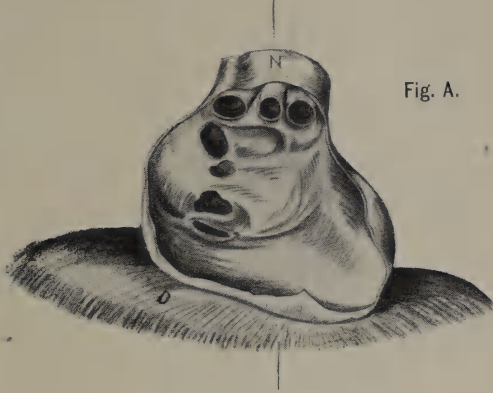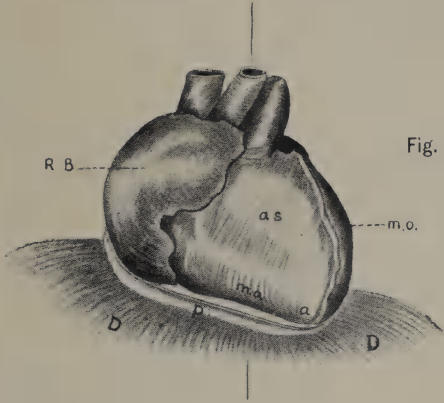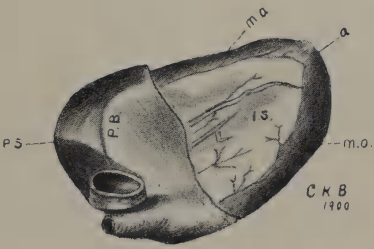
Heart and Pericardial sac of a full time Human fœtus. The subject was
hardened with formalin.

PLATE IV.
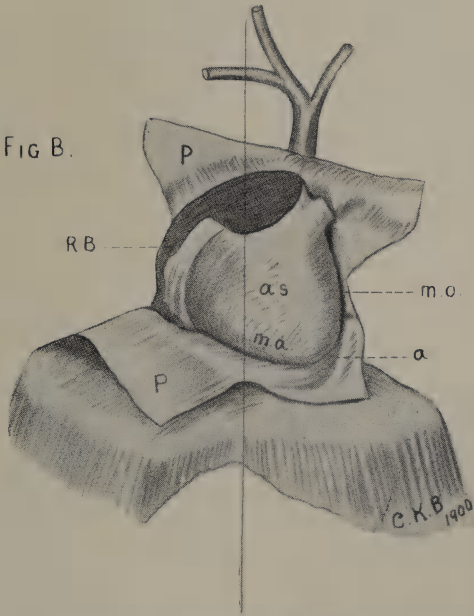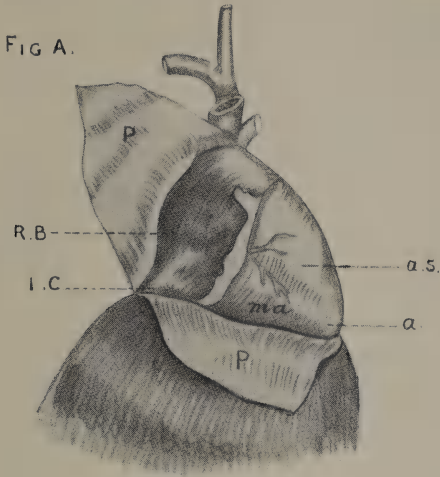
Heart of Hylobates hainanus (male) hardened *in situ* with formalin.

PLATE V.

Fig. A.

Fig. B.

Fig. C.
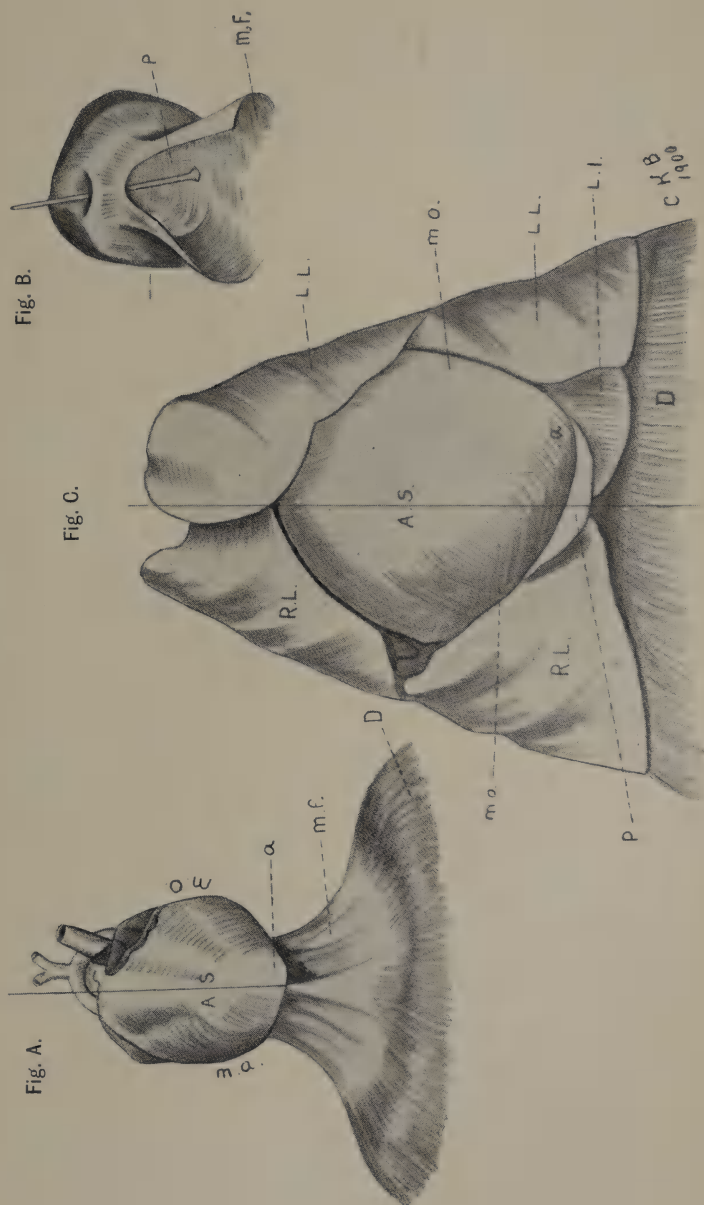
Hearts of Lagostomus and Macropus hardened *in situ* with formalin.

NOTE ON THE LYMPH CIRCULATION.

By J. S. ASHE.

In thinking over their course and surroundings it has occurred to me that in the relation of the constantly pulsating aorta to the thoracic duct may be found the explanation of one of the chief forces which aid in the carrying on of the lymph circulation.

The onward passage of the lymph through the lymphatic vessels and thoracic duct is usually attributed to the following causes:—(1) The *vis-a-tergo*, derived from the pressure in the capillaries acting on the lymph in the lymph spaces. (2) The pressure of the contracting muscles in the limbs and other parts of the body acting upon the lymphatics, which are provided with valves that allow lymph to flow in one direction only. Whenever outside muscular pressure is brought to bear on the vessels the result must be a flow of lymph towards the larger veins, this being largely assisted by the lateral anastomosis of the vessels. (3) The aspirating action of the thorax is generally held to be an important factor in the flow; the negative pressure, which is constantly present in that cavity, drawing the lymph into the thoracic duct. (4) Other forces which assist are—(*a*) the contraction of the abdominal muscles pressing upon the receptaculum chyli and the abdominal lymphatics; (*b*) the pumping action of the diaphragm as described by Ludwig; (*c*) the contraction of the muscular fibres of the villi—probably of the lymph vessels generally; and (*d*) the aspirating action of the heart, producing a negative pressure within the large veins, into which the thoracic duct opens.

To these forces I would venture to add another. It has
occurred to me that the distension of the aorta which takes
place at each contraction of the heart must have a consider-
able influence in forcing the lymph onwards through the
receptaculus chyli and the thoracic duct, owing to the close
anatomical relation which exists between these latter structures
and the aorta. In the middle and lower portions of the
thorax the thoracic duct is placed behind and to the right of
the thoracic aorta, and in close relation to it. To the right
of the duct lies the vena azygos major, and behind, but a
short distance removed, is the rigid vertebral column. These
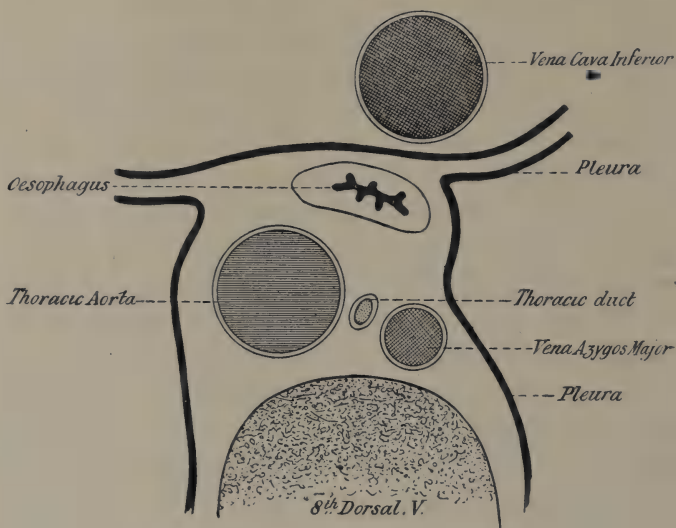
Diagram of Posterior Mediastinum.
(From a frozen section.)

three vessels are placed within the posterior mediastinum,
between the two pleural sacs. At every contraction of the
heart a large increase of the contents of the aorta takes
place, and as a result a considerable expansion of that vessel
is produced. This expansion would affect the thoracic duct

in two ways. In the first place, it would compress it against the vertebral column and the surrounding part, and owing to the disposition of the numerous valves within the duct, this pressure could not send the lymph backwards towards the abdomen. Were lateral anastomosis of the duct present there is no doubt that the pressure would send it onwards, as in the case of the muscular pressure in the limbs already referred to; but even without this lateral anastomosis it seems probable that at least part of the lymph would be forced onwards towards the upper end of the duct by the pressure of the expanding aorta. The receptaculum chyli, lying, as it does, between the aorta and the right crus of the diaphragm, would be similarly affected.

The second way in which the aorta might influence the flow is by raising the pressure within the posterior mediastinum. The expansion of aorta within this limited space, which takes place at each stroke of the ventricle, must increase the pressure within the mediastinum. The effect of this increase of pressure would be to drive the contained lymph from the lower part of the duct into the upper, where it lies on the left side of the œsophagus, and is freely exposed to the general negative pressure within the thorax.

In order the more clearly to explain the view which I, with great diffidence, have ventured to put forward above, I have constructed a simple schema, which, I think, demonstrates the course of events as I have described them.

DIRECTIONS.

Milk (Lymph) is poured down the funnel G, flowing through K (which represents afferent lymphatic trunk) to receptaculum chyli, I; when the latter is full the heart, A, is then squeezed, which causes distention of aorta, B, beneath the crura of diaphragm, D, which then presses upon the receptaculum chyli, J, pumping the milk into F (the thoracic duct), from which it cannot return owing to valves at H. On further working of heart milk is pumped up, showing distinct pressure in the mercurial manometer, E. C allows the air to escape from aorta at anything over a pressure of 120 mm.
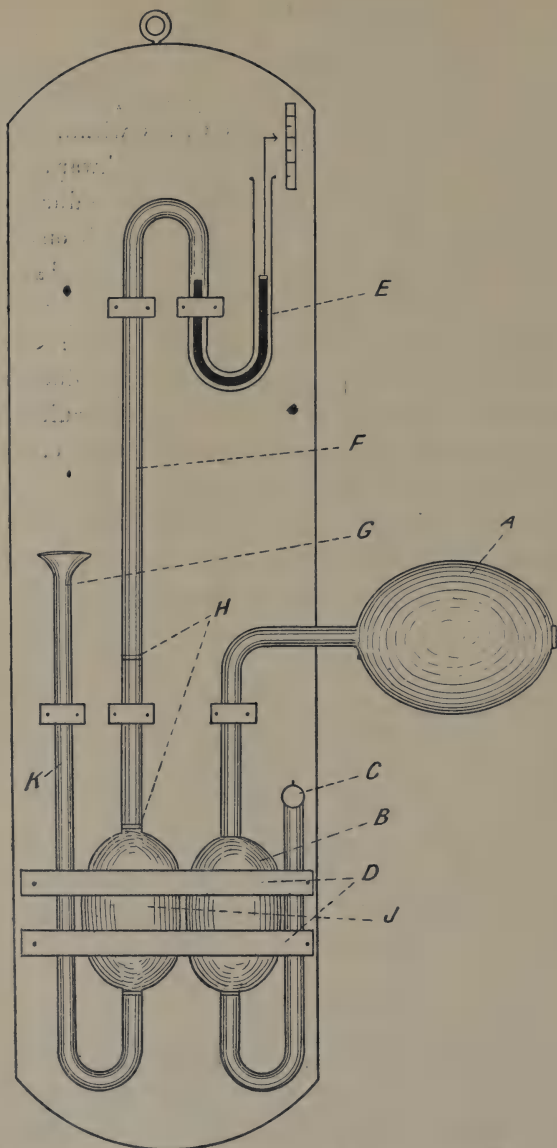
A—Heart.
B—Aorta.
C—Valve 120 mm.
D—Crura of diaphragm.
E—Mercurial manometer.

F—Thoracic duct.
G—Funnel for milk.
H—Valves in duct.
J—Receptaculum chyli.
K—Syphon for milk.

SOME RECENT RESEARCHES ON THE TOPO-GRAPHY OF THE CONVOLUTIONS AND FISSURES OF THE BRAIN.

By EDWARD H. TAYLOR, M.D., B.Ch., F.R.C.S.I.;
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University Examiner in Anatomy, Trinity College;

AND

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University Demonstrator of Röntgen Photography.

THE remarkable advances which have been made in recent years in cerebral localisation render it imperative that we should possess an accurate knowledge of cerebral topography. In other words, it is of the highest importance that we should be able to indicate on the surface of the living head the main fissures and convolutions of the subjacent brain.

I do not purpose to enter at all fully into the subject of cerebral localisation, but shall merely allude in the briefest manner to the events which have led up to the present state of our knowledge. This has been the outcome of experiment and observation extending over a lengthened period. The views of phrenologists held their ground for many years. According to them the human brain possessed many different faculties, which were allocated over a corresponding number of cortical areas. These were mapped out on the surface of the head, and so one's character, according to the phreno-logists, could be accurately gauged by the number of bumps one possessed. Such doctrines were soon destined to become exploded, as they were found to be at complete variance with the discoveries of pathologists, especially as regards aphasia.

2 K

In the year 1863 Broca established the fact that, in right-handed people, the third left frontal convolution is the portion of the grey matter of the cortex important for articular speech. Several distinct forms of aphasia were subsequently described, and accordingly the bulk of evidence went to show that different regions of the brain are of different significance for the intellectual functions.

Huylings-Jackson pointed out that a form of epilepsy was caused by irritative lesions affecting certain areas of the brain cortex.

It is to the physiologists, however, that we are indebted more particularly for the bulk of our knowledge, as their ingenious experiments have added most satisfactory support to clinical and pathological observations.

Fritz and Hitzig based their results upon the phenomena following galvanic excitation of the surface of the brain in animals. They noticed that stimulation of definite regions was followed by movements of certain parts of the body.

Ferrier used Faradic stimulation, and observed that the movements which followed were of a purposeful character.

Munk removed certain convolutions, and was able to show that disturbances of sensory activity followed, similar to those produced by disease.

Goltz succeeded in keeping a dog alive for some time after entire removal of the brain cortex, and was, therefore, able to observe what faculties the animal possessed when only the lower regions of the brain were functional and uncontrolled by the cerebrum.

In more recent times the work of His and Flechsig has thrown new and valuable light upon the functions possessed by the cortical regions of the brain by a study of the manner of their development. Flechsig was able to follow the various tracts through their myelinisation. The tracts which are functional earliest receive their myelin before the others.

He has shown that the fibres in the spinal cord, medulla. pons, and corpora quadrigemina are almost entirely medullated when the higher parts show little or no myelin. In the new-born child the cerebrum is almost entirely immature, and proportionately few fibres are medullated.

According to Flechsig the sensory paths in the brain first become medullated, and may be observed developing one after another, beginning with that of smell, and ending with that for auditory impulses from the periphery to the cortex. In this way it has been observed that the individual sensory paths terminate in tolerably sharply circumscribed cortical regions, for the most part widely removed from one another, being separated by masses of cortical substance, which remain for a considerable period immature or undeveloped. The sense cortical areas thus mapped out correspond entirely to those regions of the surface of the brain which pathological observation has shown to stand in relation to the different qualities of sensation.

Flechsig has further observed that new paths begin to develop from the points where certain of the sense fibres terminate and pursue a downward course. They can be followed from the cortex to the medulla, and to the motor nuclei of the cord. These descending paths are mainly those known as *the pyramidal or motor tracts*, and the area from which they develop, commonly called the Rolandic region, is, according to Flechsig, concerned in the sensation of touch. He calls it the somæsthetic area. It includes the anterior and posterior central convolutions, the paracentral lobule, and a portion of the gyrus fornicatus. The sensory fibres passing from the periphery to this area would appear to excite conscious sensations of touch, pain, temperature, muscle and tendon sense, equilibrium, &c.—sensations which tell us of the condition of our bodies rather than of external objects. This large area probably represents a complex mass of sense

centres, rather than a single sensory area, and in addition to being a sensory field, the somæsthetic area is also *the great motor region of the brain.*

As regards the other sensory areas, *olfactory fibres* seem to end mainly in the uncinate gyrus. *Visual fibres* may be traced to the neighbourhood of the calcarine fissure, and *auditory fibres* to the temporal lobe.

When all the sensory centres are fully developed—*i.e.,* when the sensory fibres going to them and the motor fibres passing from them become connected with the lower motor centres, only about one third of the whole cortical area has been accounted for. Two thirds of the cortex, therefore, appear to have nothing to do with the periphery, but to be reserved for another and apparently a higher work. These areas correspond to the main portion of the frontal lobe, part of the insula, a large portion of the temporal and occipital lobes, and a large area in the posterior parietal region of the brain. Flechsig calls these regions of the cortex *association centres,* and believes they furnish arrangements for uniting the various central sense areas. He also considers these association centres as being concerned in the higher intellectual manifestations—viz., memory, judgment, reflection, and so on. Briefly, then, Flechsig's researches have established the fact that the human cerebral cortex is made up of, at least, seven anatomically more or less well-separated areas; he calls them sense centres and association centres.

Sense Centres
{
Somæsthetic area.
Visual sense area.
Olfactory area.
Auditory area.
}

Association Centres
{
Frontal or anterior.
Insular or middle.
Parieto-occipital or posterior.
}

With this brief *resumé* of the leading facts relating to cerebral localisation, I shall now explain the method which,

in conjunction with Mr. Haughton, I have employed recently in making some researches in cerebral topography. Before doing so, however, I think it would be well to enumerate and define some of the more common terms employed to signify points of localisation on the skull (Fig. 1.)

1. Nasion; the centre of the naso-frontal suture. It can generally be made out without difficulty as a depression at the root of the nose.

2. Glabella. This is an area rather than a definite point. It corresponds to the interval on the frontal bone between the supraciliary ridges overlying the nasion.

3. Bregma. The point of junction of the coronal and sagittal sutures. It may be distinguished by touch in some subjects.

4. Auricular point. The centre of the external auditory meatus.

5. Pre-auricular point. It lies immediately above the zygoma in front of the tragus, and is sometimes indicated by a faint depression.

6. Orbito-temporal angle. A slight depression immediately above the external angular process of the frontal bone at the commencement of the temporal ridge.

7. Lambda. The point of junction of the sagittal and lambdoid sutures. It is sometimes distinguishable to touch, and in the adult lies about $2\frac{1}{2}$ inches above the external occipital protuberance.

8. Inion. The external occipital protuberance. It can usually be distinctly felt.

Cerebral topography is a subject which in recent times has been investigated by numerous observers, and a great many devices have been employed and rules laid down for ascertaining the position of the main fissures and convolutions with reference to the surface of the head. However, on an occasion such as the present it would be quite

impossible for me to deal with them, even in the most cursory
manner. Many I consider open to serious objection, and
amongst such I would include (1) methods in which land-
marks of a vague nature and difficult to find are employed,
as, for example, the lambda, the parietal eminence, the
glabella ; (2) methods which entail difficult measurements ;
(3) methods requiring the manipulation of complicated in-
struments.

A method to be of practical utility should possess the
following advantages :—(1) *It should be applicable essentially
to the intact head* without there being any necessity to turn
aside flaps, consisting of the scalp tissues, so as to disclose
deeper landmarks. (2) *The guides or landmarks should be
easily located.* Amongst those of undoubted utility I would
include the following :—The nasion, the external angular
process, the orbito-temporal angle, the external auditory
meatus, the zygoma, the external occipital protuberance or
inion. (3) *It should be applicable to heads of different sizes,
different shapes, and different ages.*

I shall now proceed to explain the method which we have
employed in ascertaining the topography of the main fissures
of the brain. It suggested itself to me as I was carrying
out some investigations in visceral anatomy in subjects pre-
served with formalin. The latter, as is well known, is a
powerful hardening agent ; when injected into the blood-
vessels it gives the tissues a very firm consistency, enabling
them to retain their shape after removal from the body. In
addition, it has a decided advantage over spirit and certain
other preservative fluids, in that it does not cause shrinkage
of the tissues in the hardening process. Briefly stated, the
idea which occurred to me was to harden a subject with
formalin, subsequently to remove the head, divide it
accurately in the mesial sagittal plane, remove the cere-
bral hemisphere from one side, introduce some metallic

substance into the main fissures, replace the hemisphere, and have an "X-ray" photograph taken of the part. On bringing the matter under the notice of my friend, Mr. Haughton, to whom I am greatly indebted for the "X-ray" part of the work, he suggested that we should employ soft tin wire. This we found admirably adapted for the purpose. The plan worked most satisfactorily. In all the heads examined we found the brain thoroughly well hardened, so that it retained its shape perfectly after removal, and had not the slightest difficulty in moulding the wire into the fissures, and replacing the hemisphere accurately in its bony case. The beautiful skiagrams which I show to-night were taken by Mr. Haughton, and I think they amply demonstrate the value of "X-rays" in this branch of anatomical investigation. The diagrams which I shall show, illustrating various points in cerebral topography, have been carefully copied from these skiagrams. As Mr. Haughton will explain his part of the work presently, I shall proceed without further comment to describe the method for mapping out the main fissures of the brain, which we find most reliable, and which possesses, to my mind, many practical advantages over others which have been recommended from time to time.

In order to be able to map out the various areas of the brain cortex on the surface of the head there are *three fundamental fissures* which it is especially necessary to localise, as they help to separate the four main lobes of the brain from each other. They are—

        1. The fissure of Sylvius.

        2. The fissure of Rolando.

        3. The external parieto-occipital fissure.   (Fig. 2.)

If lines can be drawn on the surface of the head corresponding to these fissures, it becomes a comparatively easy matter to locate the various convolutions on the outer aspect of the brain cortex.

We begin by measuring accurately the distance between the nasion and inion (*naso-iniac line*), and subsequently we divide it into four equal parts, which are indicated by means of an aniline pencil. From the orbito-temporal angle draw a line to the junction of the third and fourth segments of the naso-iniac line. (Fig. 2.) It will usually be found to correspond to the posterior limb of the fissure of Sylvius in the greater part of its extent, and consequently it may be termed *the Sylvian line*. Its posterior part will be found, as a rule, to overlie or very closely approximate the external parieto-occipital fissure. (Fig. 2.) If now another line be drawn from the junction of the first and second segments of the naso-iniac line to the centre of the external auditory meatus, it will be found that its point of intersection with the Sylvian line *will overlie the Sylvian point*—that is, the point where the main stem of the fissure of Sylvius reaches the outer aspect of the hemisphere.

The fissure of Rolando is found as follows :—In the adult take a point (superior Rolandic) three-quarters of an inch behind the centre of the naso-iniac line. This will usually be found to correspond to 53 to 55 per cent. of the naso-iniac distance, measuring from before backwards. The lower Rolandic point is found by erecting a perpendicular to the upper margin of the zygoma, starting from the pre-auricular point to meet the Sylvian line. Should, however, the upper margin of the zygoma be difficult to determine, the perpendicular (pre-auricular line) may be erected on a line connecting the centre of the infra-orbital margin with the centre of the external auditory meatus or auricular point. The Rolandic line may now be drawn by connecting these two points. Of course it will be understood that, as the fissure pursues a markedly sinuous outline, the line so drawn will merely indicate its main direction. Furthermore, the fissure does not reach quite up to the middle line above, and it terminates below about half an inch from the Sylvian line.

BREGMA

ORBITO-
TEMPORAL
ANGLE

LAMBDA

GLABELLA

NASION

INION

PREAURICULAR
POINT

AURICULAR
POINT
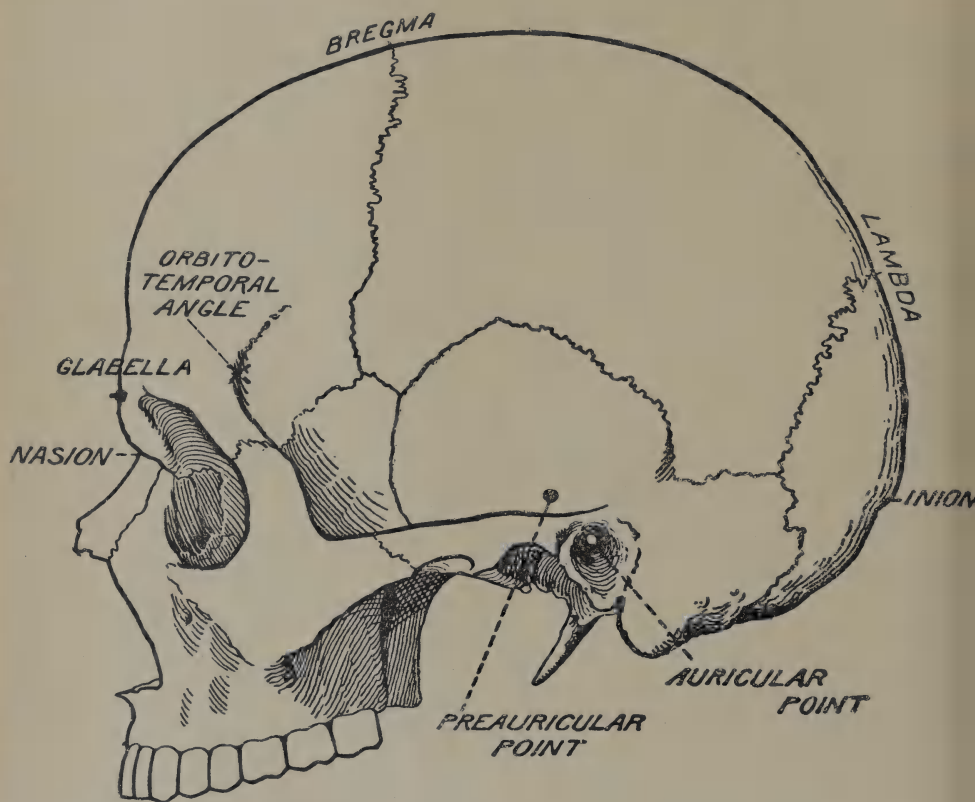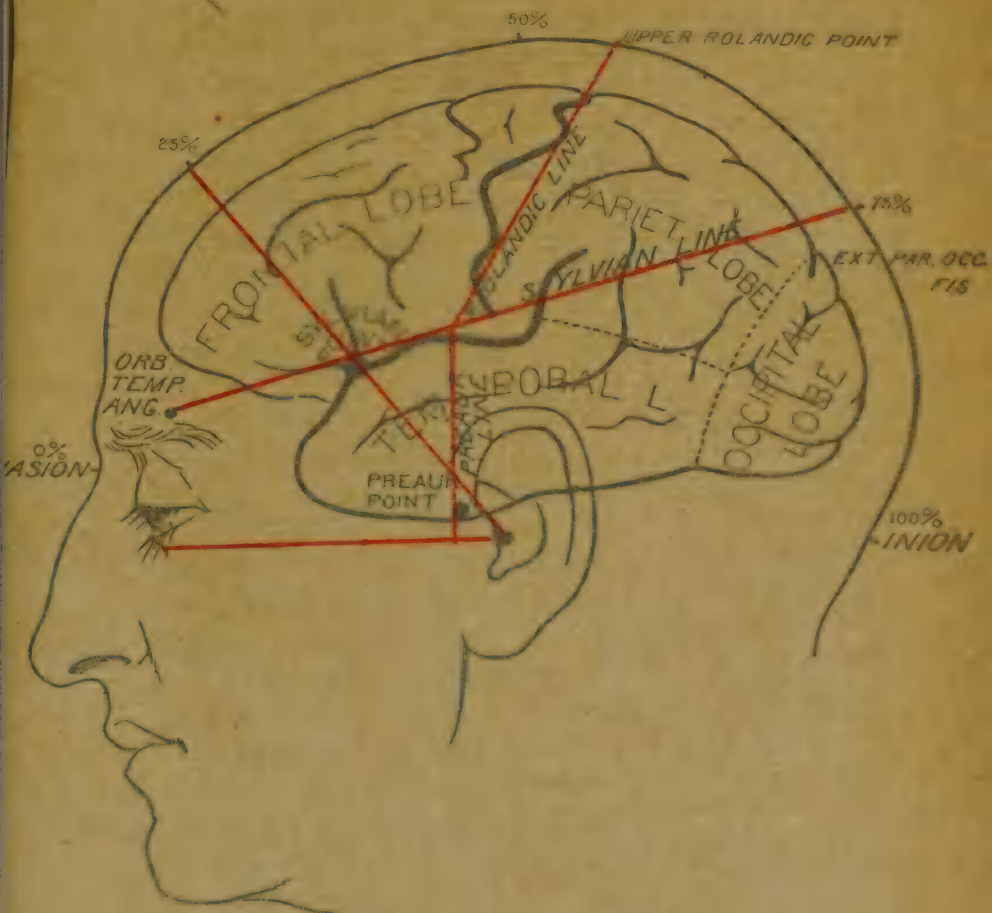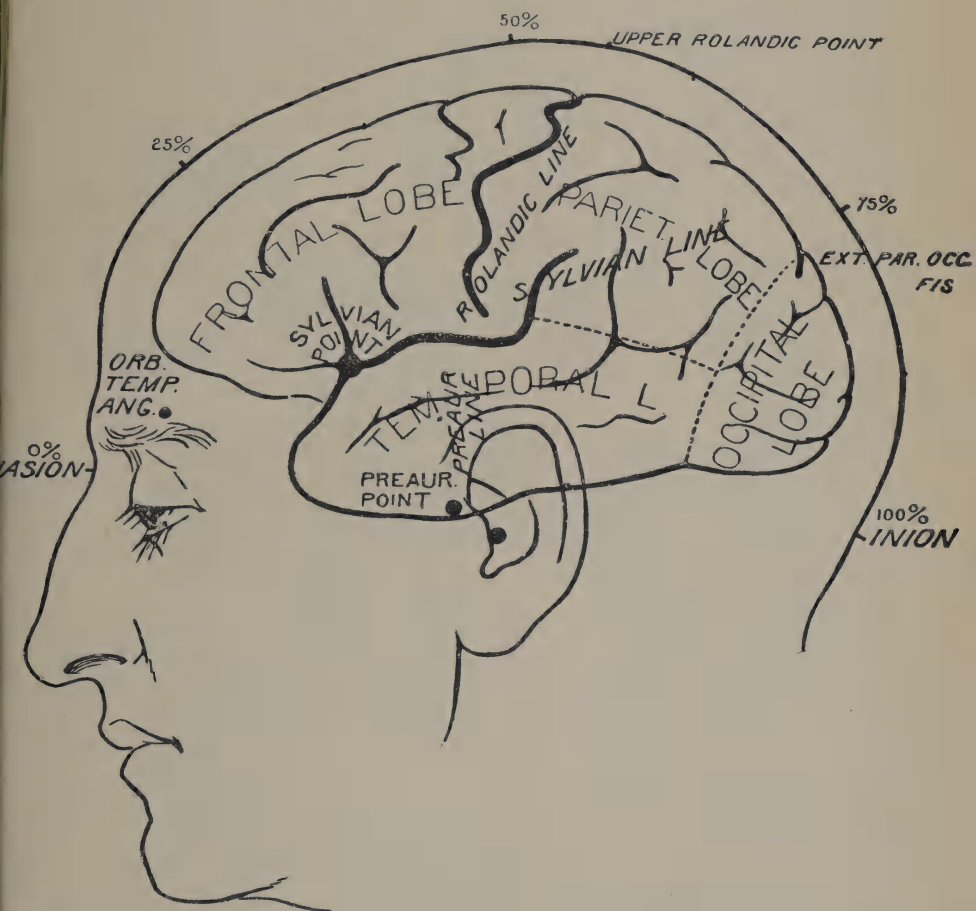
Such is briefly an outline of the principal points which it is essential to know if we wish to map out the fissures and convolutions which are related to the outer aspect of the brain. As I have already stated, if we can locate the three fundamental fissures, the remainder of our task presents little difficulty. We have examined a large number of heads, and of ages varying from one year up to seventy, and in all the above method has proved exceedingly accurate, as, indeed, can be readily judged by referring to the skiagrams, which are of life size. I wish to tender my best thanks to Professor Cunningham for the great facilities which he afforded me, and for the kindly interest which he displayed in the course of this investigation. To Mr. Haughton also I am greatly indebted for his invaluable co-operation.

Edward H. Taylor.

Some time ago, in discussing the possibility of using " X-rays " as a means of investigating Cerebral Topography, it occurred to us that by making use of some substance opaque to " X-rays " we could work out the principal fissures and convolutions in a brain which had been hardened in a subject injected with formalin.

At my suggestion we made use of very soft wire—an alloy of tin and antimony, used in electrical work as " safety fuse " wire.

Our method of proceeding was as follows:—Having got a suitable subject, hardened throughout by injecting it with 10 per cent. formalin solution, and letting it lie for three weeks, the head and neck were separated from the thorax, and an accurate sagittal section made through the head and neck. The falx cerebri having been carefully removed by dissection, the temporal pole was divided by a coronal section, so as to allow the hemisphere of the brain

to fall out of its bony case, without engaging in the middle fossa of the skull, much as a shape of jelly is dislodged from its mould. The internal surface of hemisphere was then received on a circular glass plate by gently tapping skull. The fissures were now ready to receive this tin wire, which is so ductile and soft that it makes no impression on the hardened brain, whose consistence resembles that of cheese. The leading fissures, such as that of Rolando and Sylvius, were then accurately and gently filled from end to end with this wire, and any foramina or cavities, such as the entrance and course of Eustachian tube or nasal duct, were mapped out in wire.

The important landmarks on the skin of scalp were also marked by wire sutures (such as the nasion, occipital protuberance) and the sagittal points between them accurately in the middle line, and any other landmarks of significance, such as orbito-temporal angle and the pre-auricular point.

The cerebral hemisphere was then carefully returned to its bony case by gently lowering the half skull down on it. The preparation was then ready for exposure to the " X-rays."

The method of exposure was as follows:—Having prepared a photographic plate of sufficient size, by enclosing it in light-tight paper bags, it is laid on a deal board. Over the plate a celluloid film is spread, to prevent moisture from the preparation affecting the plate. The preparation is then inverted over the celluloid film and laid on the photo plate with the internal or flat surface next plate.

The " X-ray " apparatus used is the powerful 18in. coil, by Apps, in the " X-ray " department in the Pathological Laboratory, Trinity College. This apparatus I use because of its great power, which permits us to work at longer distances from the preparation, thus diminishing the error due to " divergence " of the " X-rays."

MALE HEAD.

Shows wires in the Fissures of Rolando and Sylvius.

FEMALE HEAD.

Shows wires in the Fissures of Rolando and Sylvius; and in the Prae-Central, Superior and Inferior Frontal, Intraparietal (ascending portion), and Parallel Sulci.

Ɜ   Over Supra-Marginal Gyrus.

ᚦ   Over Angular Gyrus.

Another wire lies in the nasal duct.

Fine wires are shown sutured to the surface of the skin to mark the Orbito-temporal angle, Pre-auricular point, Nasion, Inion, and the line between these two latter 'quadrisected,' giving the Sagittal points.

Another wire, $\frac{3}{4}$ inch, behind the mid-point of Naso-Iniac line, marks the Superior Rolandic point.
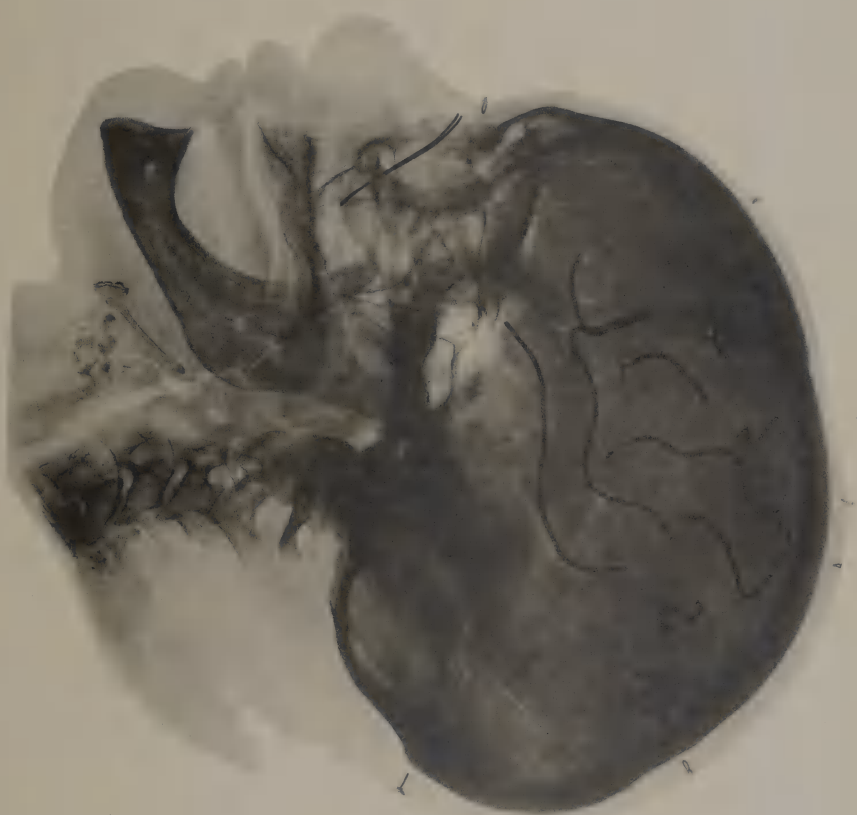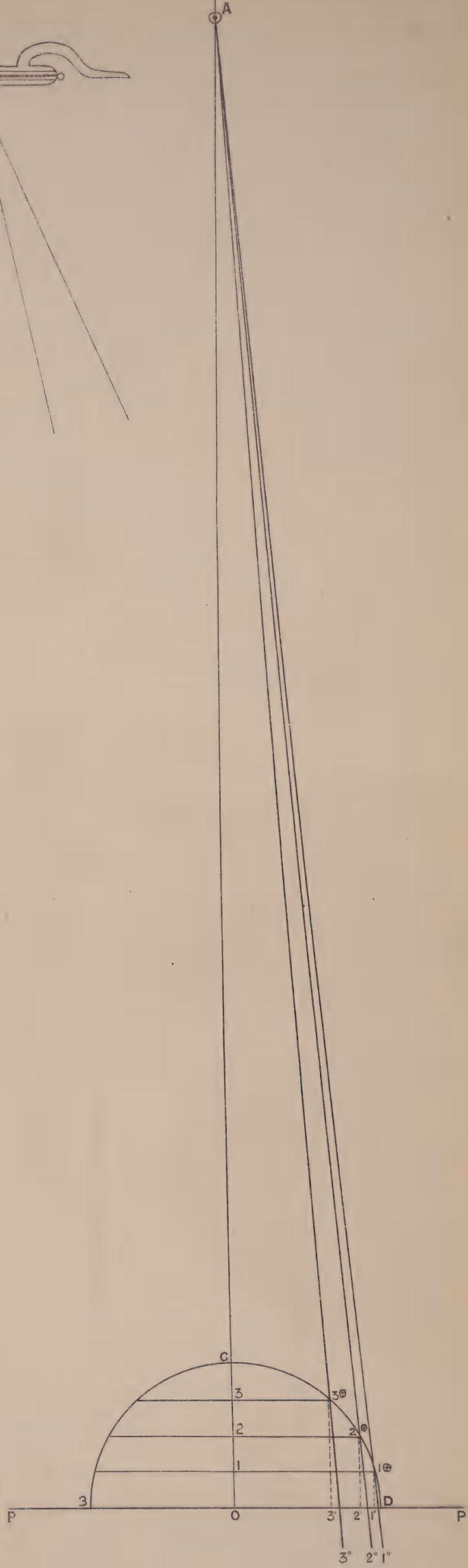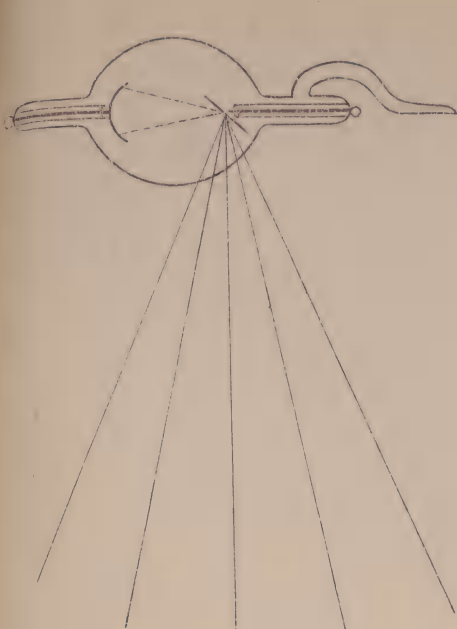
A = centre of anode of tube.

A O = height of anode from photo. plate—*i.e.*, 3′ 6″.

B C D = semicircle representing skull of 8″ diameter.

1⊕ 2⊕ 3⊕ are points on surface of semicircle, 1″, 2″, and 3′ respectively from
plate (P — P).

1′ 2′ and 3′, their vertical projection on P — P.

1″ 2″ 3″, the "X-ray" projection of same points (1, 2, and 3) on P — P.

Therefore the error is measured on base line P — P as 1′ to 1″, 2′ to 2″ and
3′ to 3″ (maximum).

Error in projection of point 3 is 3′ to 3″ = $\frac{3}{16}$ of an inch (maximum error).

    ,,   ,,   2 is 2′ to 2″ = $\frac{1}{8}\frac{1}{4}$,,   ,,

    ,,   ,,   1 is 1′ to 1″ = $\frac{3}{32}$,,   ,,

All would be covered by a $\frac{3}{4}$″ trephine.

The working distance of the anode of the tube from plate is 3ft. 6in. to 4ft., and the centre of the anode is accurately placed perpendicularly over a fixed point by a plumb line. The point on skull selected being the inferior Rolandic point.

As regards the accuracy or inaccuracy of this method you will be able to judge for yourselves from what Mr. Taylor has said, and also by an examination of the skiagrams handed round; but to reduce the method and its errors as much as possible to a mathematical certainty, I have prepared a diagram, drawn accurately to scale, which is meant to reproduce the path traversed in the air by the " X-rays," and its relation to various parts of a hemisphere of 8in. in diameter, which represents the largest skull we have yet had to deal with.

On this hemisphere of 8in. in diameter, with the " X-ray " tube at a working distance of 3ft. 6in., the maximum error possible proves to be $\frac{3}{16}$ inch, and this occurs only at one region, the error vanishing as we approach the central parts, where the rays are more nearly perpendicular.

We may, therefore, fairly claim that any error produced in this method of cerebral topography will be well covered by a $\frac{3}{4}$-inch trephine.

In conclusion, I venture to express the hope that this proof of the experimental error or distortion due to " X-rays " in a sphere of 8in. diameter, being confined to $\frac{3}{16}$ in., will be another apology for the use of the " X-rays " in general surgical affections of Bone; because the rays have too often been accused of inaccuracy, owing to the fact that in such cases they were not applied or interpreted with a due regard to the anatomy of the part, or the advantages of using a plumb line over that part.

William S. Haughton.

PROFESSOR CUNNINGHAM endorsed what had been said as to the extreme value of the paper. The first researches on the topography of the brain were made almost simultaneously in France and Edinburgh. In France they adopted the clumsy method of boring holes in the skull, and inserting pins through them, after which the brain was removed. Turner adopted the better method of removing small portions of the cranial wall, and carefully marking the piece of brain surface so exposed. In Dublin they could claim the credit of having first attempted to fix the relation between the brain and the cranium. Two questions occurred to him regarding the method made use of by Drs. Taylor and Haughton. First, what was the range of error possible in photographs of that kind? and second, what was the possibility of error where, as in the present case, the brain was taken out and then replaced?

DR. DAWSON noted that Dr. Taylor adopted Flechsig's views, but more recent observers seemed to be of opinion that sensory fibres did pass to the association centres. Still, Flechsig was substantially right, because, even supposing that a certain number of sensory fibres were found to reach the association centres, that did not prove that the greater part of these centres was not devoted to the work of association. It simply showed that no one part of the cortex was alone concerned with any particular sensation, but that certain portions were devoted principally to sensation and others to association.

DR. TAYLOR, replying to the second question, said that in taking out the brain he noticed certain parts corresponding to particular portions of the skull, and so was able, in replacing it, to ascertain that it occupied its original position. He removed the temporal pole that there might be no difficulty in getting the brain under the lesser wing of the sphenoid.

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